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### Title

Current Experiments in Elementary Particle Physics

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LBL-91 Revised *c.2*  
UC-34C  
March 1983

### CURRENT EXPERIMENTS IN ELEMENTARY PARTICLE PHYSICS

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*LBL-91 Rev.  
c.2*

EXAMPLE FROM THE MICROFICHE (SEE INSIDE BACK COVER)

FOR ABBREVIATIONS USED FOR PARTICLES, INSTITUTIONS, ETC., SEE THE YELLOW PAGES.

\*\*\*\*\*

CESR-CUSB (1978); APPROVED FEB 1978; STARTED NOV 1979.

EXPERIMENT NAME OR NUMBER (DATE OF PROPOSAL)  
AND PROGRESS DATES

CUSB -- HIGH RESOLUTION CALORIMETER TO STUDY THE UPSILON SPECTROSCOPY AND B PHYSICS

TITLE

COLU -- P.FRANZINI(\*SPOKESPERSON), K.HAN, S.W.PETERSON, J.K.YOH, S.YOUSSEF  
LSU -- R.IMLAY, G.LEVMAN, W.METCALF, V.SREFFEL  
MPIM -- H.DIETL, G.EIGEN, E.LORENZ, G.MAGEL  
STON -- G.FINOCCHIARO, J.E.HORSTKOTTE, C.K. GEL, P.FRANZINI, R.D.SCHAMBERGER,  
M.SIVERTZ, L.J.SPENCER, P.M.TUTS

INSTITUTIONS AND PARTICIPANTS. THE ASTERISK  
WITH "SPOKESPERSON" MEANS THE SUMMARY  
WAS CHECKED AND UPDATED BY HIM/HER

ACCELERATOR=CESR; DETECTOR=CUSB

ACCELERATOR AND DETECTOR

E+ E- --> HADRONS 9.4-11.6 GEV (ECM)  
E+ E- --> E+ E-  
E+ E- --> MU+ MU-

MAIN REACTIONS AND MOMENTA OR ENERGIES

UPSI(9460)  
UPSI(10020)  
UPSI(10350)  
UPSI(10570)  
CHI/B(10246)  
BEAUTY  
HIGGS  
GLUEBALL  
AXION

PARTICLES STUDIED

<EXPERIMENTAL COMMENT> FOR A DESCRIPTION OF THE APPARATUS, SEE THE LBL-91 SUPPLEMENT ON  
DETECTORS.

COMMENTS

<PUBLISHED PAPERS> PRL 44 (1980) 1111, PRL 45 (1980) 222, PRL 46 (1981) 1115, PRL 47  
(1981) 771, PRL 48 (1982) 906, PR D26 (1982) 717, PR D26 (1982) 720, PL 114B (1982) 277, JOURNAL PAPERS FROM EXPERIMENT  
NP B206 (1982) 1, PRL 49 (1982) 1612, PRL 49 (1982) 1616, AND PL 118B (1982) 453.

\*\*\*\*\*

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**Abstract** -- This report contains summaries of 479 approved experiments in elementary particle physics (experiments that finished taking data before 1 January 1979 are excluded). There are experiments from Brookhaven, CERN, CESR, DESY, Fermilab, Tokyo Institute of Nuclear Studies, KEK, LAMPF, Serpukhov, SIN, SLAC, and TRIUMF, and also experiments on proton decay. Properties of the beams at most of the laboratories are summarized.

*\*The Berkeley Particle Data Group is supported by the Director, Office of Energy Research, Office of High Energy and Nuclear Physics, Division of High Energy Physics of the U.S. Department of Energy under Contract No. DE-AC03-76SF00098, and by the U.S. National Science Foundation under Agreement No. PHY-8022530.*

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## INTRODUCTION

The microfiche at the back of this report contains summaries of 479 approved experiments in elementary particle physics. Experiments that finished taking data before 1 January 1979 are not included here but are available on a computer database (see p. 3). An example from the summaries is given on the inside front cover. Experiments at the following laboratories are included:

Brookhaven (BNL)	KEK
CERN	LAMPF
CESR	Serpukhov (SERP)
DESY	SIN
Fermilab (FNAL)	SLAC
Institute for Nuclear Studies, Tokyo (INS)	TRIUMF

There are also summaries of proton decay experiments (P-DECAY). A list of all the experiments with their titles begins on p. 4.

**New features in this edition** -- (1) CESR, LAMPF, SIN, TRIUMF, and P-DECAY experiments appear for the first time. (2) Preliminary versions of the summaries of experiments at Brookhaven, CERN, CESR, DESY, Fermilab, Tokyo Institute of Nuclear Studies, KEK, and SLAC were sent to spokespersons for checking and updating. If a reply was received (which occurred for 68% of these experiments), there is an asterisk by "spokesperson" in the summary. (3) Spokespersons were asked to list journal articles (if any) published from their experiments. The summaries on the microfiche include these lists. (4) There is a new supplement to LBL-91, entitled "Major Detectors in Elementary Particle Physics," in which 40 detectors are described in detail.

**Guides to the microfiche** -- There are four aids for finding particular experiments on the microfiche. One is the list of experiments and their titles already mentioned. The second is an index of initial-state particles and beam momenta, in order of increasing particle mass and momentum. The third is an index of spokespersons. Finally, the table of contents of "Major Detectors in Elementary Particle Physics" lists the experiments that use the detectors described therein.

**Abbreviations** -- To keep the summaries on the microfiche brief, abbreviations are used for kinematic variables, accelerators, journals, detectors, particles, and institutions. The abbreviations are usually obvious but are defined in the yellow pages at the center of the report.

**Properties of particle beams** -- Tables at the back of the report summarize the properties of beams for fixed-target experiments at Brookhaven, CERN, Fermilab, KEK, LAMPF, Serpukhov, SIN, SLAC, and TRIUMF.

**Acknowledgments** -- We thank P. Oddone (LBL) for encoding the proton decay experiments, G. Row (SLAC) for help with getting data from SLAC to LBL, D.R.O. Morrison (CERN) for permission to make extensive use of "Experiments at CERN in 1982," N. Baggett (BNL) for information on Brookhaven experiments, N. Gelfand (FNAL) for information on Fermilab experiments, C. Oram (TRIUMF) for a discussion about TRIUMF beams, and the approximately 300 spokespersons who

took the time to reply to our inquiries.

**Comments and requests** -- We invite comments pointing out omissions, obscurities, out-of-date information, and errors. Comments should be sent to:

Particle Data Group (50-308)  
Attn: EXPERIMENTS  
Lawrence Berkeley Laboratory  
Berkeley, CA 94720  
USA

Requests for copies from the Americas, Australasia, and the Far East should go to the above address, while those from other areas should go to:

CERN Scientific Information Service  
CH-1211 Geneva 23  
Switzerland



**SEARCHING THE EXPERIMENTS DATABASE**  
(if you already know how to use the SLAC/SPIRES system)

This report is produced from a computerized database maintained under the SLAC/SPIRES database management system. The database, named EXPERIMENTS, is updated periodically, and contains everything in this report as well as earlier experiments. In particular, Argonne (ANL) and Rutherford (RHEL) experiments from earlier editions of LBL-91 are present.

Anyone who is familiar with SLAC/SPIRES and has an existing account can access this database online. If you have an account but are unfamiliar with SPIRES, an extensive wall poster, "Guide to VM Spires," is available from the SLAC library. If you do not have an account and cannot find anyone who does (at main laboratories, ask at the library), please contact SLAC directly.

To access the database:

SELECT EXPERIMENTS

To determine what indices are available for searching:

SHOW INDEX

To see a random selection of terms in an index:

BROWSE <index-name>  
(e.g., BROWSE REACTION)

To search for experiments satisfying a certain criterion:

FIND <index-name> <value>

To list basic bibliographic information for these experiments:

TYPE

To switch to a format with more information (e.g., reactions, citations):

CLEAR FORMAT

To switch back to the basic format (with only bibliographic information):

SET FORMAT QUICKLIST

Some sample searches:

FIND AUTHOR JONES AND DATE-APPROVED 1975  
(short form: FIN A JONES AND DA 1975)

FIND TITLE J/PSI  
(short form: FIN T J/PSI)

FIND REACTION "E+ E- ----> E+ E-" AND DATE-COMPLETED AFTER 1978  
(short form: FIN RE "E+ E- ----> E+ E-" AND DC AFTER 1978;  
note the quotes required before and after the reaction)

FIND ACCELERATOR CERN-ISR  
(short form: FIN ACC CERN-ISR)

FIND DETECTOR PLUTO  
(short form: FIN DET PLUTO)

## LIST OF EXPERIMENTS AND TITLES

EXPERIMENT	TITLE
BNL-593	PROPOSAL TO STUDY MESON RESONANCES AND XI* HYPERONS IN K- P INTERACTIONS AT 3.0 AND 4.6 GEV/C USING THE BNL SPECTROMETER
BNL-646	HYPERNUCLEAR SPECTROSCOPY OF STATES FORMED BY THE COHERENT INTERACTION OF K- WITH NUCLEI
BNL-673	STUDY OF XI* RESONANCES WITH K+ DETECTOR
BNL-692	THE MEASUREMENT OF THE K+/- ELASTIC SCATTERING FROM SELECTED NUCLEI AT 800 MEV/C
BNL-696	TRANSVERSE MUON POLARIZATION IN KLONG ---> MU+ PI- NUMU DECAYS -- AN EXPERIMENTAL TEST OF TIME REVERSAL INVARIANCE
BNL-698	POLARIZED TARGET PHYSICS WITH THE MPS FOR STUDY OF STRANGE-PARTICLE REACTIONS
BNL-701	A SEARCH FOR BOUND STATES AND RESONANCES IN NUCLEON-ANTINUCLEON INTERACTIONS
BNL-702	RADIATIVE DECAY SIGMA+ ---> P GAMMA FROM POLARIZED SIGMA+ HYPERONS
BNL-704	A STUDY OF THE TIME EVOLUTION OF A LONG-LIVED NUMU BEAM
BNL-705	A SEARCH FOR NARROW AND BROAD RESONANCES DECAYING INTO KSHORT KSHORT, LAMBDA ANTI-LAMBDA, LAMBDA KSHORT AND ANTI-LAMBDA KSHORT FROM PI- P INTERACTIONS AT 20 GEV/C USING THE BNL MPS
BNL-706	SEARCH FOR NEUTRINO OSCILLATIONS AT BNL
BNL-708	SEARCH FOR GAMMA TRANSITIONS IN PBAR P ANNIHILATIONS AT REST AND LOW ENERGIES
BNL-717	MEASUREMENT OF INCLUSIVE LAMBDA POLARIZATION IN THE REACTIONS P + P ---> LAMBDA + X AND P + D ---> LAMBDA + X
BNL-722	FURTHER SEARCH FOR EXOTIC SIX-QUARK STATES
BNL-723	A PRECISION MEASUREMENT OF THE MAGNETIC MOMENT OF THE NEGATIVE SIGMA HYPERON BY THE EXOTIC ATOMS TECHNIQUE
BNL-726	SEARCH FOR CHARM IN HADRONIC INTERACTIONS NEAR THRESHOLD
BNL-730	MEASUREMENT OF THE PBAR P CHARGE EXCHANGE CROSS SECTION
BNL-732	SEARCH FOR THE ETA/C
BNL-734	A MEASUREMENT OF THE ELASTIC SCATTERING OF NEUTRINOS FROM ELECTRONS AND PROTONS
BNL-735	TRANSVERSE MUON POLARIZATION IN K+ ---> MU+ PIO NU DECAYS; AN EXPERIMENTAL TEST OF TIME REVERSAL INVARIANCE
BNL-737	STUDY OF NEUTRINO INTERACTIONS IN DEUTERIUM
BNL-738	MEASUREMENT OF THE PBAR P TOTAL CROSS SECTION
BNL-739	REQUEST FOR OCCASIONAL U-LINE PROTON BEAM FOR ACOUSTIC STUDIES
BNL-742	SEARCH FOR THE S MESON IN THE TOTAL, ELASTIC, AND ANNIHILATION PBAR P CROSS SECTIONS
BNL-744	MEASUREMENT OF INCLUSIVE SIGMAO PRODUCTION RATE AND POLARIZATION IN THE REACTION P + BE ---> SIGMAO + X
BNL-745	AN IMPROVED TEST OF QED -- AN EXPERIMENT TO MEASURE VACUUM POLARIZATION IN THE 3D-3P TRANSITIONS IN MUONIC HELIUM
BNL-746	SPIN AND ISOSPIN EFFECTS IN LIGHT HYPERNUCLEI
BNL-747	A HIGH STATISTICS STUDY OF PHI AND PHI PHI PRODUCTION FROM PI- P AND K- P INTERACTIONS AT 22 GEV/C -- A SEARCH FOR GLUEBALLS
BNL-748	POLARIZATION IN PP ELASTIC SCATTERING AT MEDIUM AND HIGH PT**2 FROM 15 TO 28.5 GEV/C
BNL-749	A MEASUREMENT OF MILLIWEAK CP VIOLATION IN KL-KS DECAYS THROUGH THE DETERMINATION OF EPSILON-PRIME
BNL-751	MEASUREMENT OF HYPERON RADIATIVE DECAY
BNL-752	A SEARCH FOR SIGMA HYPERNUCLEAR LEVELS IN O(16) IN THE (K-, PI-) REACTION
BNL-754	DETERMINATION OF THE DYNAMICS OF MU+ MOTION IN ALUMINUM
BNL-755	PI- P TWO-BODY EXCLUSIVE REACTIONS AT 90 DEG FROM 8 GEV/C TO 18 GEV/C
BNL-758	THE (PI+, K+) REACTION -- A NEW TOOL FOR THE STUDY OF HYPERNUCLEAR STRUCTURE
BNL-759	THE WEAK DECAY MODES OF HYPERNUCLEI
BNL-760	SPIN DEPENDENCE OF THE LAMBDA NUCLEUS INTERACTION DETERMINED BY OBSERVATION OF HYPERNUCLEAR GAMMA RAYS
BNL-762	SEARCH FOR NARROW STRUCTURES IN THE PBAR P ANNIHILATION CROSS SECTION FROM 1900 TO 1950 MEV
BNL-766	DEVELOPMENT OF THE HARDWARE PROCESSOR TECHNIQUE. STUDY OF OMEGA- PRODUCTION AND SPIN. STUDY OF N P ---> ALL CHARGED.
BNL-767	DEVELOPMENT OF A LOW ENERGY ANTINEUTRON SOURCE AND MEASUREMENT OF NBAR P ANNIHILATION CROSS SECTIONS NEAR ANTINUCLEON-NUCLEON THRESHOLD
BNL-769	SEARCH FOR GLUEBALLS AND OTHER MESON STATES
BNL-771	STUDY OF E-MESON CHARACTERISTICS IN PI- P, K- P, AND PBAR P INTERACTIONS
BNL-772	SEARCH FOR PBAR-NEUTRON BOUND AND RESONANT STATES
BNL-774	SEARCH FOR SIGMA HYPERNUCLEAR LEVELS IN HE4
BNL-775	NEUTRINO OSCILLATION EXPERIMENTS AT THE AGS TO COVER THE INTERVAL $0.1 < \Delta^2 \sin^2(2\alpha) < 100 \text{ EV}^2$
BNL-776	NEUTRINO-OSCILLATION EXPERIMENT AT BNL
BNL-777	SEARCH FOR THE RARE DECAY MODE K+ ---> PI+ MU+ E-
BNL-778	STUDY OF NUCLEAR FRAGMENTS PRODUCED FROM P NUCLEUS COLLISIONS IN THE THRESHOLD REGION $1 < P < 28 \text{ GEV/C}$ USING A WARM GAS JET INTERNAL TARGET
CERN-NA-001	MEASUREMENT OF THE PHOTOPRODUCTION OF VECTOR AND SCALAR BOSONS
CERN-NA-002	ELECTROMAGNETIC INTERACTIONS OF MUONS
CERN-NA-003	DIRECT PHOTON PRODUCTION IN HADRON-HADRON COLLISIONS AT THE SPS.
CERN-NA-004	INCLUSIVE DEEP INELASTIC MUON SCATTERING AND SEARCH FOR MULTIMUON EVENTS
CERN-NA-005	A STUDY OF HARD HADRON-HADRON COLLISIONS WITH A STREAMER CHAMBER VERTEX SPECTROMETER AND A CALORIMETER TRIGGER
CERN-NA-006	NEUTRON ELASTIC SCATTERING AT VERY SMALL ANGLES
CERN-NA-007	MEASUREMENT OF THE ELECTROMAGNETIC FORM FACTORS OF PI AND K MESONS AT THE SPS
CERN-NA-008	HADRON ELASTIC SCATTERING AT SMALL ANGLES
CERN-NA-009	STUDY OF FINAL STATES IN DEEP INELASTIC MUON SCATTERING
CERN-NA-010	HIGH RESOLUTION STUDY OF THE INCLUSIVE PRODUCTION OF MASSIVE MUON PAIRS BY INTENSE PION BEAMS
CERN-NA-011	MEASUREMENT OF CHARMED PARTICLE PRODUCTION IN HADRONIC REACTIONS
CERN-NA-012	STUDY OF PI- P INTERACTIONS WITH NEUTRAL FINAL STATES
CERN-NA-013	SEARCH FOR DIRECT EVIDENCE FOR CHARM IN HADRONIC INTERACTIONS USING A HIGH RESOLUTION BUBBLE CHAMBER
CERN-NA-014	PHOTOPRODUCTION AT HIGH ENERGY AND HIGH INTENSITY
CERN-NA-015	SEARCH FOR CHARMED HADRON PRODUCTION IN PI- NUCLEUS INTERACTIONS IN NUCLEAR EMULSION
CERN-NA-016	STUDY OF THE HADRONIC PRODUCTION AND PROPERTIES OF NEW PARTICLES WITH A LIFETIME $10^{-13} \text{ S} < \tau < 10^{-10} \text{ S}$ USING LEBE-EHS
CERN-NA-017	MOMENTUM AND ANGULAR CORRELATIONS STUDY IN PI- NUCLEI JETS AT HIGH ENERGIES USING AN EMULSION TELESCOPE TECHNIQUE WITH MAGNETIC FIELD
CERN-NA-018	SEARCH FOR SHORT-LIVED PARTICLES PRODUCED ON NUCLEI WITH A HEAVY LIQUID MINI BUBBLE CHAMBER
CERN-NA-019	DIRECT OBSERVATION OF BEAUTY PARTICLES SELECTED BY MUONIC DECAY IN EMULSION
CERN-NA-020	MEASUREMENTS OF PI+, PI-, K+, K-, P, AND PBAR YIELDS IN 400 GEV PROTON BERYLLIUM AND COPPER COLLISIONS
CERN-NA-021	A HIGH STATISTICS STUDY OF PBAR-P ANNIHILATION PHYSICS AT THE EHS
CERN-NA-022	THE INFLUENCE OF PARTON STRUCTURE ON HADRONIC INTERACTIONS IN EHS WITH A K+/PI+/P BEAM AT 250 GEV/C
CERN-NA-023	STUDY OF DIFFRACTIVE DISSOCIATION ESPECIALLY INTO STRANGE AND CHARMED PARTICLES WITH EHS
CERN-NA-024	DEEP INELASTIC SCATTERING PROCESSES INVOLVING LARGE PT DIRECT PHOTONS IN THE FINAL STATE
CERN-NA-025	STUDY OF CHARM AND BOTTOM PARTICLE PRODUCTION USING A HOLOGRAPHIC BUBBLE CHAMBER
CERN-NA-026	A PROTOTYPE EXPERIMENT TO STUDY CHARMED PARTICLE PRODUCTION AND DECAY USING A HOLOGRAPHIC HIGH RESOLUTION HYDROGEN CHAMBER (HOLEBC) AND THE EUROPEAN HYBRID SPECTROMETER
CERN-NA-027	AN EXPERIMENT TO MEASURE ACCURATELY THE LIFETIME OF THE D0, D+, D-, F+, F-, LAMBDA/C CHARM PARTICLES AND TO STUDY THEIR HADRONIC PRODUCTION AND DECAY PROPERTIES
CERN-NA-028	STUDY OF SHADOWING AND HADRON PRODUCTION IN HIGH ENERGY MUON SCATTERING USING NUCLEAR TARGETS
CERN-NA-029	STUDY OF PI- PIO PRODUCTION VIA PRIMAKOFF EFFECT ON NUCLEI
CERN-NA-030	PRECISION DETERMINATION OF THE LIFETIME OF THE NEUTRAL PION
CERN-NA-031	MEASUREMENT OF THE RATIO $\frac{\sigma(\text{ETA}00)}{\sigma(\text{ETA}+-)}$
CERN-NA-032	INVESTIGATION OF CHARM PRODUCTION IN HADRONIC INTERACTIONS USING HIGH-RESOLUTION SILICON DETECTORS
CERN-PS-153	HUNT FOR NARROW-BARYON FORMATION IN PI- P BACKWARD ELASTIC SCATTERING
CERN-PS-157	HIGH PRECISION MEASUREMENT OF PI- P TOTAL CROSS SECTION
CERN-PS-159	STRANGE DIBARYON SYSTEMS
CERN-PS-160	MEASUREMENT OF A AND R PARAMETERS IN THE REACTION $\text{PI}+ \text{P} \rightarrow \text{K}+ \text{SIGMA}+$

## LIST OF EXPERIMENTS AND TITLES

EXPERIMENT	TITLE
CERN-PS-161	SEARCH FOR STRONGLY BOUND STATES OF THE ANTIPROTON-PROTON, ANTIPROTON-DEUTERON, AND ANTIPROTON-FEW-NUCLEON STATES
CERN-PS-162	STUDY OF THE STRUCTURE OF EXOTIC LIGHT NUCLEI PRODUCED AT THE PS
CERN-PS-163-1	SEARCH FOR NARROW BARYONIUM STATES NEAR THE ANTI-P P THRESHOLD
CERN-PS-163-2	MEASUREMENT OF THE PBAR P EXCITATION FUNCTION
CERN-PS-164	THE INFLUENCE OF CHANNELLING ON ATOMIC AND NUCLEAR REACTION YIELDS
CERN-PS-165	MEASUREMENT OF THE K- P SCATTERING LENGTH AT THRESHOLD BY OBSERVATION OF KAONIC HYDROGEN X-RAYS FROM A CONDENSED TARGET
CERN-PS-166	SEARCH FOR SIGMA HYPERNUCLEAR STATES USING THE STRANGENESS EXCHANGE REACTIONS (K-, PI-) AND (K-, PI+)
CERN-PS-167	BACKGROUND CALIBRATION FOR A PROTON-LIFETIME DETECTOR
CERN-PS-168	TO TEST A PROTOTYPE OF A PROTON LIFETIME DETECTOR IN A NEUTRINO BEAM AT THE PS
CERN-PS-169	SEARCH FOR NEUTRINO OSCILLATIONS
CERN-PS-170	PRECISION MEASUREMENTS OF THE PROTON ELECTROMAGNETIC FORM FACTORS IN THE TIME-LIKE REGION AND VECTOR MESON SPECTROSCOPY
CERN-PS-171	A STUDY OF PBAR-P INTERACTIONS AT REST IN A H2 GAS TARGET AT LEAR
CERN-PS-172	PBAR-P TOTAL CROSS SECTIONS AND SPIN EFFECTS IN PBAR P ---> K+ K-, PI+ PI-, PBAR P ABOVE 200 MEV/C
CERN-PS-173	MEASUREMENT OF PBAR-P CROSS SECTIONS AT LOW PBAR MOMENTA
CERN-PS-174	PRECISION SURVEY OF X-RAYS FROM PBAR-P (PBAR-D) ATOMS USING THE INITIAL LEAR BEAM
CERN-PS-175	MEASUREMENT OF THE ANTIPROTONIC LYMAN AND BALMER X-RAYS OF PBAR-H AND PBAR-D ATOMS AT VERY LOW TARGET PRESSURES
CERN-PS-176	STUDY OF X-RAY AND GAMMA-RAY SPECTRA FROM ANTIPROTONIC ATOMS AT THE SLOWLY EXTRACTED ANTIPROTON BEAM OF LEAR
CERN-PS-177	A SEARCH FOR HEAVY HYPERNUCLEI AT LEAR
CERN-PS-178	ANTINEUTRON PRODUCTION AT LEAR
CERN-PS-179	STUDY OF THE INTERACTION OF LOW-ENERGY ANTIPROTONS WITH H(2), HE(3), HE(4), AND NE NUCLEI USING A STREAMER CHAMBER IN A MAGNETIC FIELD
CERN-PS-180	SEARCH FOR NEUTRINO OSCILLATIONS AT CERN PS USING BEBC
CERN-PS-181	CONTRIBUTION OF THE CHARM COLLABORATION TO THE CERN NEUTRINO OSCILLATION PROGRAM
CERN-PS-182	INVESTIGATIONS ON BARYONIUM AND OTHER RARE PBAR-P ANNIHILATION MODES USING HIGH-RESOLUTION PION SPECTROMETERS
CERN-PS-183	SEARCH FOR BOUND NEAR-N STATES USING A PRECISION GAMMA AND CHARGED PION SPECTROMETER AT LEAR
CERN-PS-184	STUDY OF ANTIPROTON NUCLEUS INTERACTION WITH A HIGH RESOLUTION MAGNETIC SPECTROMETER
CERN-PS-185	STUDY OF THRESHOLD PRODUCTION OF PBAR P TO YBAR Y AT LEAR
CERN-PS-186	NUCLEAR EXCITATIONS BY ANTIPROTONS AND ANTIPROTONIC ATOMS
CERN-PS-187	A GOOD STATISTICS STUDY OF ANTIPROTON INTERACTIONS WITH NUCLEI
CERN-PS-188	MEASUREMENTS OF CHANNELLING RADIATION AND ITS POLARIZATION, X-RAY EXCITATION, TOGETHER WITH DEVIATIONS FROM LANDAU DISTRIBUTIONS
CERN-R-108	STUDY OF HIGH TRANSVERSE MOMENTUM PHENOMENA
CERN-R-110	STUDY OF HIGH MASS ELECTRON PAIRS AND HIGH PT PHENOMENA
CERN-R-209	HIGH MASS MUON PAIRS AND ASSOCIATED HADRONS
CERN-R-210	PRECISE MEASUREMENT OF THE PROTON-ANTIPROTON TOTAL CROSS-SECTION AT THE CERN-ISR
CERN-R-211	MEASUREMENT OF THE ANTIPROTON-PROTON TOTAL CROSS-SECTION AT THE CERN-ISR
CERN-R-415	STUDY OF EVENTS WITH LARGE ANGLE ELECTRONS IN THE SFM
CERN-R-416	STUDY OF RARE EVENTS AT THE SPLIT FIELD MAGNET
CERN-R-418	P-ALPHA AND ALPHA-ALPHA COLLISIONS IN THE ISR
CERN-R-419	STUDY OF EVENTS WITH IDENTIFIED FORWARD PARTICLES AT THE SPLIT FIELD MAGNET
CERN-R-420	STUDY OF LN S PHYSICS IN PBAR-P INTERACTIONS AT THE SPLIT FIELD MAGNET
CERN-R-421	STUDY OF PROTON-PROTON AND PROTON-ANTIPROTON COLLISIONS AT THE SFM FACILITY OF THE CERN ISR
CERN-R-422	STUDY OF HEAVY FLAVORS PRODUCTION IN P P INTERACTIONS AT BCM = 62 GEV
CERN-R-501	SEARCH FOR MAGNETIC MONOPOLES
CERN-R-607	CORRELATIONS BETWEEN HIGH PL MESONS PRODUCED IN P P COLLISIONS AT THE ISR
CERN-R-608	LARGE-X HADRON PHYSICS AND CORRELATIONS WITH CENTRAL REGION PHENOMENA
CERN-R-703	EVALUATION OF A LARGE STREAMER CHAMBER DETECTION SYSTEM AND A STUDY OF ANTIPROTON-PROTON PROTON-PROTON DIFFERENCES AT ISR ENERGIES
CERN-R-704	CHARMONIUM SPECTROSCOPY AT THE ISR USING AN ANTIPROTON BEAM AND A HYDROGEN JET TARGET
CERN-R-806	STUDY OF LARGE TRANSVERSE MOMENTUM PHENOMENA
CERN-R-807	A STUDY OF LARGE TRANSVERSE MOMENTUM PHENOMENA
CERN-R-808	A STUDY OF DIRECT PHOTON PRODUCTION
CERN-SC-094	STUDY OF THE PRODUCTION OF SINGLE PIONS IN PION-PROTON COLLISIONS NEAR THRESHOLD
CERN-UA-01	A 4PI SOLID ANGLE DETECTOR FOR THE SPS USED AS A PROTON-ANTIPROTON COLLIDER AT A CENTRE OF MASS ENERGY OF 540 GEV
CERN-UA-02	STUDY OF ANTIPROTON-PROTON INTERACTIONS AT 540-GEV C.M. ENERGY
CERN-UA-03	SEARCH FOR MAGNETIC MONOPOLES AT THE ANTI-P P COLLIDING RING
CERN-UA-04	MEASUREMENT OF ELASTIC SCATTERING AND OF TOTAL CROSS-SECTION AT THE CERN ANTI-P P COLLIDER
CERN-UA-05	INVESTIGATION OF PROTON-ANTIPROTON EVENTS AT 540-GEV C.M. ENERGY WITH A STREAMER CHAMBER DETECTION SYSTEM
CERN-UA-06	AN INTERNAL HYDROGEN JET TARGET IN THE SPS TO STUDY INCLUSIVE ELECTROMAGNETIC FINAL STATES AND LAMBDA PRODUCTION IN PBAR-P AND PP INTERACTIONS AT ECM = 22.5 GEV
CERN-WA-001	HIGH-ENERGY NEUTRINO INTERACTIONS
CERN-WA-006	POLARIZATION IN P P AND PI P ELASTIC SCATTERING
CERN-WA-007	TWO-BODY REACTIONS AT LARGE TRANSVERSE MOMENTUM
CERN-WA-011	SEARCH FOR HIGH MASS STATES PRODUCED WITH THE PSI(3.1)
CERN-WA-018	STUDY OF SEMI-LEPTONIC NEUTRAL CURRENT PROCESSES AND OF MUON POLARIZATION PRODUCED IN NU AND ANTI-NU INTERACTIONS USING COUNTER TECHNIQUES
CERN-WA-021	HIGH ENERGY NU AND ANTI-NU INTERACTIONS IN BEBC FILLED WITH H2
CERN-WA-022	AN EXPERIMENT IN BEBC TO COMPARE NEUTRAL AND CHARGED CURRENT NEUTRINO INTERACTIONS INDUCED BY NU/PI AND NU/K AT THE SAME ENERGY
CERN-WA-025	NEUTRINO AND ANTINEUTRINO INTERACTIONS IN DEUTERIUM
CERN-WA-027	K+ P INTERACTIONS IN BEBC AT 70 GEV/C
CERN-WA-028	K- P INTERACTIONS IN BEBC AT 110-GEV/C
CERN-WA-033	SYSTEMATIC SEARCH FOR LONG-LIVED HEAVY PARTICLES IN THE S1 BEAM
CERN-WA-035	MEASUREMENT OF THE CORRELATIONS BETWEEN EMITTED PROTONS AND PIONS IN HADRON-NUCLEUS COLLISIONS FOR 60 TO 150 GEV/C INCOMING MOMENTA
CERN-WA-038	MAGNETIC MONOPOLE SEARCH AT THE SPS
CERN-WA-042	AN EXPERIMENT ON THE STRONG INTERACTIONS AND RADIATIVE DECAYS OF HYPERONS
CERN-WA-044	SEARCH FOR QUARKS IN HIGH-ENERGY NEUTRINO INTERACTIONS
CERN-WA-046	STUDY OF OMEGA- DECAYS AND OF THE SIGMA- ---> N E- NU DECAY MODE
CERN-WA-047	CONTINUATION OF THE STUDY OF NEUTRINO INTERACTIONS WITH DICHROMATIC BEAMS AT THE SPS, USING BEBC FILLED WITH NEON
CERN-WA-049	STUDY OF PBAR P INTERACTIONS INVOLVING BARYON EXCHANGE USING THE OMEGA SPECTROMETER
CERN-WA-051	STUDY OF PI+/- INTERACTIONS IN BEBC AT 25-GEV/C AND 60-GEV/C
CERN-WA-052	A SECOND GENERATION BEAM DUMP EXPERIMENT IN BEBC
CERN-WA-054	BEAM DUMP EXPERIMENT WITH 400-GEV PROTONS
CERN-WA-055	TEST OF OMEGAPRIME ACCURACY AND K+ P ELASTIC SCATTERING AT 12 GEV/C AROUND 90-DEGREES C.M.
CERN-WA-056	STUDY OF N ANTI-N STATES PRODUCED VIA BARYON EXCHANGE IN PI+ P INTERACTIONS USING THE OMEGAPRIME SPECTROMETER
CERN-WA-057	STUDIES OF HIGH MASS VECTOR MESON PHOTO PRODUCTION IN THE ENERGY RANGE 20 TO 70 GEV
CERN-WA-058	MEASUREMENT OF THE LIFETIME OF CHARGED PARTICLES IN NUCLEAR EMULSION EXPOSED TO AN 80 GEV BREMSSTRAHLUNG BEAM IN CONJUNCTION WITH THE OMEGA PRIME SPECTROMETER
CERN-WA-059	MEASUREMENT OF NUCLEON STRUCTURE FUNCTIONS IN HORN FOCUSED NEUTRINO AND ANTI-NEUTRINO BEAMS IN BEBC FILLED WITH NEON
CERN-WA-060	STUDY OF STRANGEONIUM AND BARYONIUM PRODUCED IN K- P INTERACTIONS USING THE OMEGA PRIME SPECTROMETER
CERN-WA-061	INELASTIC INTERACTIONS OF HIGH ENERGY HADRONS (PBAR, K+, K-, PI-) WITH EMULSION NUCLEI

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CERN-WA-062	SEARCH FOR THE CHARMED STRANGE BARYON $\Lambda_0$
CERN-WA-063	INCLUSIVE BARYON-ANTIBARYON PRODUCTION IN THE CENTRAL REGION USING THE OMEGA SPECTROMETER
CERN-WA-064	CHANNELLING RADIATION IN A SILICON CRYSTAL
CERN-WA-065	FURTHER STUDIES OF PROMPT NEUTRINO PRODUCTION IN 400 GEV PROTON NUCLEUS COLLISIONS
CERN-WA-066	FURTHER STUDY OF PROMPT NEUTRINO PRODUCTION IN PROTON-NUCLEUS COLLISIONS USING BEBC
CERN-WA-067	STUDY OF $\pi^-$ -P INTERACTIONS AT 85 GEV/C LEADING TO $K^+K^+K^-K^-$ IN THE FINAL STATE -- SEARCH FOR NEW STATES
CERN-WA-068	FURTHER STUDY OF PROMPT NEUTRINO PRODUCTION IN A PROTON BEAM DUMP EXPERIMENT
CERN-WA-069	PHOTOPRODUCTION IN THE ENERGY RANGE 70-200 GEV
CERN-WA-070	STUDY OF DIRECT PHOTON EVENTS IN HADRONIC COLLISIONS
CERN-WA-071	AN EXPERIMENT TO STUDY BEAUTY PRODUCTION AND LIFETIME IN THE UPGRADED OMEGAPRIME SPECTROMETER
CERN-WA-072	A STUDY OF FAST PROTON PRODUCTION IN $\pi^+/\pi^-$ NUCLEUS INTERACTIONS USING THE OMEGA SPECTROMETER
CERN-WA-074	ANTI-PROTON-PROTON GLORY SCATTERING
CERN-WA-075	AN EXPERIMENT TO OBSERVE DIRECTLY BEAUTY PARTICLES SELECTED BY MUONIC DECAY IN EMULSION AND TO ESTIMATE THEIR LIFETIMES
CERN-WA-076	STUDY OF THE MESONS PRODUCED CENTRALLY IN THE REACTION $P + P \rightarrow P + X_0$ AND $\pi^+ + P \rightarrow \pi^+ + P + X_0$ AT 85 GEV/C
CERN-WA-077	SEARCH FOR DIRECT PRODUCTION OF GLUONIUM STATES IN HIGH PT $\pi^-$ -N COLLISIONS AT 350 GEV/C
CESR-CLEO	THE CLEO EXPERIMENT AT CESR
CESR-CUSB	CUSB -- HIGH RESOLUTION CALORIMETER TO STUDY THE UPSILON SPECTROSCOPY AND B PHYSICS
DESY-ARGUS	A NEW DETECTOR FOR DORIS
DESY-CRYSTAL-BALL	A LARGE SOLID ANGLE NEUTRAL DETECTOR (THE CRYSTAL BALL)
DESY-LENA	PROPOSAL FOR MEASUREMENTS IN CONTINUATION OF DESY-147
DESY-PETRA-CELLO	PROPOSAL FOR A 4 $\pi$ MAGNETIC DETECTOR FOR PETRA -- CELLO
DESY-PETRA-JADE	JADE -- PROPOSAL FOR A COMPACT MAGNETIC DETECTOR AT PETRA
DESY-PETRA-MARKJ	A SIMPLE DETECTOR TO MEASURE $e^+e^-$ REACTIONS AT HIGH ENERGIES -- MARK J
DESY-PETRA-PLUTO	PROPOSAL FOR EXPERIMENTS AT PETRA WITH PLUTO
DESY-PETRA-PLU-2	A PROPOSAL TO STUDY GAMMA-GAMMA INTERACTIONS WITH THE DETECTOR PLUTO AT PETRA
DESY-PETRA-TASSO	PROPOSAL FOR A LARGE 4 $\pi$ MAGNETIC DETECTOR FOR PETRA -- TASSO
FNAL-053A	SEARCH FOR THE INTERMEDIATE BOSON, LEPTON PAIR PRODUCTION, AND A STUDY OF DEEPLY INELASTIC REACTIONS UTILIZING HIGH ENERGY NEUTRINO INTERACTIONS IN LIQUID NEON
FNAL-180	A STUDY OF ANTINEUTRINO INTERACTIONS IN THE FERMLAB 15-FT BUBBLE CHAMBER, FILLED WITH HYDROGEN AND NEON
FNAL-253	NEUTRINO-ELECTRON SCATTERING AT NAL
FNAL-258	A PROPOSAL TO MEASURE PARTICLES PRODUCED AT HIGH TRANSVERSE MOMENTUM BY PIONS
FNAL-272	PROPOSAL TO MEASURE COHERENT DISSOCIATION OF $\pi^-$ , $K^-$ , AND $PBAR$ INTO TWO-BODY SYSTEMS AT NAL ENERGIES
FNAL-326	A PROPOSAL TO MEASURE MUON PAIRS PRODUCED AT HIGH TRANSVERSE MOMENTUM BY PIONS
FNAL-356	STUDIES OF DEEP INELASTIC DIFFERENTIAL DISTRIBUTIONS AT HIGH ENERGIES FOR NEUTRINO AND ANTINEUTRINO BEAMS
FNAL-361	PRECISION MEASUREMENT OF $\Lambda$ -- $\rightarrow e^- \nu_\mu p$ DECAY PARAMETERS
FNAL-380	STUDY OF PROPERTIES OF WEAK NEUTRAL CURRENTS IN THE INTERACTIONS OF A NARROW BAND NEUTRINO BEAM IN LIQUID NEON
FNAL-388	PROPOSAL TO STUDY NEUTRAL CURRENT NEUTRINO AND ANTI-NEUTRINO INTERACTIONS IN THE 15-FOOT BUBBLE CHAMBER USING THE EXTERNAL MUON IDENTIFIER AND A DICHROMATIC BEAM
FNAL-390	ANTINEUTRINO INTERACTIONS IN THE DEUTERIUM FILLED 15 FOOT BUBBLE CHAMBER
FNAL-400	CHARMED PARTICLE PRODUCTION BY NEUTRONS
FNAL-401	PHOTOPRODUCTION OF HIGH MASS TWO-BODY FINAL STATES
FNAL-458	PHOTOPRODUCTION EXPERIMENT AT FERMLAB
FNAL-466	A PROPOSAL FOR THE STUDY OF HIGH-ENERGY REACTION MECHANISMS BY THE MEASUREMENT OF THE ANGULAR AND ENERGY DISTRIBUTIONS OF NUCLEI RECOLLING FROM TARGETS BOMBARDED WITH 200-300 GEV PROTONS
FNAL-490	SEARCH FOR SHORT LIVED PARTICLES USING A HIGH RESOLUTION STREAMER CHAMBER
FNAL-497	HYPERON FLUXES AND POLARIZATIONS
FNAL-502	SEARCH FOR MONOPOLES ABOVE THE 15-FOOT BUBBLE CHAMBER
FNAL-508	STUDY OF MECHANISM FOR MULTIPLE PRODUCTION OF PARTICLES AT HIGH ENERGIES; EMULSION EXPOSURE TO ABOUT 750 GEV PROTONS
FNAL-515	PROPOSAL TO STUDY CHARM PARTICLES PRODUCED IN HADRONIC INTERACTIONS
FNAL-516	PROPOSAL TO STUDY PHOTOPRODUCTION OF FINAL STATES OF MASS ABOVE 2.5 GEV WITH A MAGNETIC SPECTROMETER IN THE TAGGED PHOTON LAB
FNAL-524	PROPOSAL TO STUDY PROTON-NUCLEUS INTERACTIONS IN EMULSION PLATES WITH EMBEDDED METAL POWDER GRANULES AT HIGHEST AVAILABLE ENERGY ( $> 400$ GEV)
FNAL-531	A PROPOSAL TO STUDY WEAK DECAY LIFETIMES OF NEUTRINO PRODUCED PARTICLES IN A TAGGED EMULSION SPECTROMETER
FNAL-533	PROPOSAL TO MEASURE THE RATE OF FORMATION OF $\pi^+ \mu$ ATOMS IN KLONG $\rightarrow \pi^+ \mu \nu$ DECAY
FNAL-537	PROPOSAL TO STUDY ANTI-P N INTERACTIONS IN THE P-WEST HIGH INTENSITY LABORATORY
FNAL-545	PROPOSAL TO STUDY NEUTRINO INTERACTIONS IN DEUTERIUM IN THE 15-FOOT BUBBLE CHAMBER WITH PLATES
FNAL-549	A SEARCH FOR FRACTIONAL CHARGES USING ACCELERATOR AND LOW TEMPERATURE TECHNIQUES
FNAL-553	A PROPOSAL TO SEARCH FOR SHORT-LIVED PARTICLES PRODUCED BY ANTINEUTRINOS AND NEUTRINOS
FNAL-555	A PROPOSAL TO STUDY CROSS SECTIONS AND POLARIZATION IN NEUTRAL STRANGE PARTICLE PRODUCTION AT HIGH TRANSVERSE MOMENTUM
FNAL-557	PROPOSAL TO STUDY HADRON JETS WITH THE CALORIMETER TRIGGERED MULTIPARTICLE SPECTROMETER
FNAL-564	DIRECT DETECTION OF SHORT-LIVED PARTICLES FROM NEUTRINO INTERACTIONS IN NUCLEAR EMULSIONS INSIDE THE 15-FOOT BUBBLE CHAMBER
FNAL-565	A STUDY OF THE DETAILED CHARACTERISTICS OF HADRON-NUCLEUS COLLISIONS USING THE FERMLAB HYBRID SPECTROMETER
FNAL-567	SEARCH FOR CHARM PRODUCTION IN 200 GEV/C HADRON INTERACTIONS
FNAL-570	PROPOSAL FOR A STUDY OF PARTICLE PRODUCTION AND DYNAMICS FROM $x = 0$ TO $x = 1$ AND THE DEPENDENCE ON INCIDENT QUANTUM NUMBERS
FNAL-576	500 GEV PROTON INTERACTIONS IN NUCLEAR EMULSION
FNAL-577	PROPOSAL TO MEASURE $\pi^+ p$ ELASTIC SCATTERING AT LARGE ANGLES
FNAL-580	A SEARCH FOR NARROW AND BROAD RESONANCES DECAYING INTO $\Lambda$ - $\Lambda$ , $\Lambda$ - $\Lambda$ - $\pi$ , $K$ (SHORT)- $K$ (SHORT) AND $K$ (SHORT)- $K$ (SHORT)- $\pi$ FROM $\pi^- p$ INTERACTIONS AT 200-GEV/C USING THE FERMLAB MPS
FNAL-584	PROPOSAL TO SEARCH FOR THE DECAY OF NEW LONG-LIVED NEUTRAL PARTICLES WITH A MASS AND LIFETIME EXCEEDING THAT OF THE $K$ (LONG)
FNAL-585	EXCLUSIVE $K^+ n$ CHARGE EXCHANGE
FNAL-591	BROAD SEARCH FOR NEW HADRONIC STATES VIA HIGH RESOLUTION CHARGE AND MASS DETERMINATION OF NUCLEAR FRAGMENTS FROM $p$ -NUCLEUS COLLISIONS
FNAL-594	PROPOSAL FOR A NEW NEUTRINO DETECTOR AT FERMLAB
FNAL-595	A STUDY OF CHARM AND PROMPT SINGLE MUON PRODUCTION IN PROTON-NUCLEON AND PION-NUCLEON COLLISIONS
FNAL-597	PROPOSAL FOR A HIGH STATISTICS STUDY OF $PBAR$ P ANNIHILATIONS AND A COMPARISON OF $PBAR$ , $P$ , $\pi^-$ , $\pi^+$ , AND $K^+$ INTERACTIONS ON HYDROGEN, MAGNESIUM AND GOLD AT 100-GEV/C UTILIZING THE FERMLAB 30-INCH HYDROGEN BUBBLE CHAMBER AND DOWNSTREAM PARTICLE IDENTIFIER
FNAL-605	A STUDY OF LEPTONS AND HADRONS NEAR THE KINEMATIC LIMITS
FNAL-608	A SEARCH FOR $\eta/c$ IN HADRONIC INTERACTIONS
FNAL-609	A STUDY OF THE STRUCTURE OF HIGH PT HADRONIC INTERACTIONS
FNAL-610	PION PRODUCTION OF HEAVY QUARK MESON STATES DECAYING INTO $\psi/J(3097)$
FNAL-612	A PROPOSAL TO MEASURE THE DIFFRACTIVE PHOTON DISSOCIATION ON HYDROGEN
FNAL-613	PROPOSAL FOR A PROMPT NEUTRINO EXPERIMENT AT FERMLAB
FNAL-615	A STUDY OF THE FORWARD PRODUCTION OF MASSIVE PARTICLES
FNAL-616	PROPOSAL TO MEASURE NEUTRINO STRUCTURE FUNCTIONS
FNAL-617	A STUDY OF DIRECT CP VIOLATION IN THE DECAY OF THE NEUTRAL KAON VIA A PRECISION MEASUREMENT OF $ABS(\eta_{100}/\eta_{+-})$
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FNAL-621	A MEASUREMENT OF THE CP VIOLATION PARAMETER $\eta_{+-0}$
FNAL-622	PROPOSAL TO SEARCH FOR FRACTIONAL CHARGE PARTICLES FROM A MAGNETIZED BEAM DUMP
FNAL-623	HIGH-MASS STATES DECAYING INTO PHI PI AND PHI PHI PRODUCED CENTRALLY IN 300 GEV/C PI- P INTERACTIONS
FNAL-629	MEASUREMENT OF DIRECT PHOTON PRODUCTION IN HADRON-NUCLEUS COLLISIONS
FNAL-630	STUDY OF B PARTICLE AND CHARMED PARTICLE PRODUCTION AND DECAY USING A HIGH RESOLUTION STREAMER CHAMBER
FNAL-631	A MEASUREMENT OF NUCLEAR CALIBRATION CROSS SECTIONS FOR PROTONS BETWEEN 100 AND 1000 GEV
FNAL-632	AN EXPOSURE OF THE 15-FOOT BUBBLE CHAMBER WITH A NEON-HYDROGEN MIXTURE TO A WIDEBAND NEUTRINO BEAM FROM THE TEVATRON
FNAL-636	NEUTRINO INTERACTION STUDIES WITH A HEAVY LIQUID BUBBLE CHAMBER AT TEVATRON ENERGIES USING A BEAM DUMP TECHNIQUE TO PRODUCE THE NEUTRINO BEAM
FNAL-640	THE MULTIMUON SPECTROMETER AT THE TEVATRON
FNAL-646	SEARCH FOR THE NUTAU AND STUDY OF NUC AND ANUC INTERACTIONS
FNAL-649	PROPOSAL TO STUDY NUCLEON STRUCTURE FUNCTIONS AT HIGH Q SQUARED
FNAL-650	SEARCH FOR CHARM PRODUCTION IN HADRON INTERACTIONS
FNAL-652	NEUTRINO PHYSICS AT THE TEVATRON
FNAL-653	A PROPOSAL TO MEASURE CHARM AND B DECAYS VIA HADRONIC PRODUCTION IN A HYBRID EMULSION SPECTROMETER
FNAL-660	PROPOSAL TO STUDY THE EFFECT OF BENT CRYSTALS ON CHANNELING NEAR THE CRITICAL RADIUS OF BENDING
FNAL-663	COMPARISON OF POLARIZATIONS OF INCLUSIVELY PRODUCED LAMBDA AND ANTILAMBDA BY PROTONS, ANTIPROTONS, KAONS AND PIONS ON HYDROGEN
FNAL-665	MUON SCATTERING WITH HADRON DETECTION AT THE TEVATRON
FNAL-666	EMULSION EXPOSURE TO SIGMA MINUS BEAM AT FERMILAB
FNAL-672	A STUDY OF HADRONIC FINAL STATES PRODUCED IN ASSOCIATION WITH HIGH-PT JETS AND HIGH-MASS DIMUONS
FNAL-673	CHI MESON PRODUCTION BY HADRONS
FNAL-687	HIGH ENERGY PHOTOPRODUCTION OF STATES CONTAINING HEAVY QUARKS AND OTHER RARE PHENOMENA
FNAL-690	STUDY OF HADRONIC PRODUCTION AND SPECTROSCOPY OF STRANGE, CHARM, AND BOTTOM PARTICLES AT THE TEVATRON
FNAL-701	A SEARCH FOR NEUTRINO OSCILLATIONS WITH $(\Delta M)^2$ GREATER THAN $10 \text{ EV}^2$
FNAL-704	INTEGRATED PROPOSAL ON FIRST ROUND EXPERIMENTS WITH THE POLARIZED BEAM FACILITY
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FNAL-706	A PROPOSAL TO MEASURE DIRECT PHOTON PRODUCTION AT TEVATRON ENERGIES
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FNAL-715	PRECISION MEASUREMENT OF THE DECAY SIGMA- -> N E- NU
FNAL-720	PROPOSAL TO SEARCH FOR +1/3 E STABLE PARTICLES USING CRYOGENIC SOURCES
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INS-14-2	PION, P, DEUTERON PHOTOPRODUCTION OFF NUCLEI
INS-14-3	MEASUREMENT OF THE DIFFERENTIAL CROSS SECTION FOR THE REACTION $\gamma p \rightarrow \eta p$ BY TAGGED PHOTON BEAM
INS-14-4	MEASUREMENT OF THE POLARIZED TARGET ASYMMETRY OF THE REACTION $\gamma n \rightarrow \pi^- p$ IN THE SECOND RESONANCE REGION
INS-15-1	MEASUREMENT OF THE RECOIL PROTON POLARIZATION IN THE REACTION $\gamma p \rightarrow \pi^0 p$
INS-15-2	MEASUREMENT OF $\gamma p \rightarrow (\pi^+/- \text{ OR } p) + \text{ ANYTHING}$ BY TAGGED PHOTON BEAM
INS-15-3	MEASUREMENT OF THE BACKWARD DIFFERENTIAL CROSS SECTION FOR $(\gamma, p)$ REACTION OFF DEUTERIUM AND CARBON
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INS-16-1	MEASUREMENT OF POLARIZED TARGET ASYMMETRY IN THE REACTION $\gamma \text{DEUT} \rightarrow p n$ IN THE ENERGY RANGE BETWEEN 300 AND 650 MEV
INS-16-2	MEASUREMENT OF PI- PHOTOPRODUCTION RATE ON NUCLEUS TARGET
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KEK-TR-001	STUDY OF ELECTRON-POSITRON ANNIHILATION PHENOMENA BY A DETECTOR WITH PARTICLE IDENTIFICATION
KEK-TR-002	TRISTAN E+ E- EXPERIMENTS BY VENUS COLLABORATION
KEK-010	SEARCH FOR RARE DECAY MODES $K^+ \rightarrow \pi^+ \nu \text{ ANU}$ , $K^+ \rightarrow \pi^+ 2\gamma$ , AND $K^+ \rightarrow \pi^+ \text{ AXION}$
KEK-033	MEASUREMENT OF AP P TOTAL CROSS SECTION AND FORWARD ELASTIC SCATTERING AT 396-737 MEV/C
KEK-034	MEASUREMENT OF THE POLARIZATION FOR THE REACTIONS $K^+ n \rightarrow K^+ n$ , $K^0 p$ AT 1.06, 1.28, 1.39, AND 1.49 GEV/C
KEK-045	PRODUCTION OF DIRECT ELECTRONS IN P NUCLEUS COLLISIONS AT 13 GEV/C
KEK-049	PRODUCTION OF POLARIZED LAMBDA PARTICLES AND THEIR BETA DECAYS
KEK-057	STUDIES OF P P INTERACTIONS IN THE MOMENTUM RANGE 0.9-2.0 GEV/C
KEK-062	STUDY OF AP P REACTIONS IN THE 3 TO 5 GEV/C REGION
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KEK-066	MEASUREMENTS OF PI0, ETA, OMEGA, PHI, AND DETECTION OF X(2800) AT HIGH PT
KEK-074	SEARCH FOR BARYONIUM STATES IN ANTIPROTON-NUCLEON INTERACTIONS
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KEK-080	STUDY OF DEUTERIUM-PROTON REACTIONS FROM 2.0 TO 4.0 GEV/C
KEK-081	ASYMMETRY IN THE ELASTIC SCATTERING OF K+ AND PI+ FROM DEUTERIUM NEAR 1.5 GEV/C
KEK-082	NUCLEAR REACTIONS WITH HIGH ENERGY PARTICLE BEAMS
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KEK-084	STUDY OF HADRON-NUCLEUS INTERACTIONS WITH EMULSION CHAMBERS
KEK-089	SEARCH FOR A HEAVY NEUTRINO EMITTED IN $K^+ \rightarrow \mu^+ \nu$ DECAY
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KEK-099	STUDY OF $\mu^+$ POLARIZATION IN $K-\mu-2$ DECAY
LAMPF-015	ELASTIC SCATTERING AND TOTAL CROSS SECTION MEASUREMENTS OF PROTON ON HYDROGEN, DEUTERIUM, AND HELIUM
LAMPF-031	A NEUTRINO EXPERIMENT TO TEST MUON CONSERVATION
LAMPF-032	PRECISION MEASUREMENT OF THE PROCESSES $\pi^+ \rightarrow \pi^0 e^+ \nu$
LAMPF-058-120	MEASUREMENT OF PI- P -> GAMMA N, AND MEASUREMENT OF THE POLARIZATION ASYMMETRY AND THE DIFFERENTIAL CROSS SECTION OF PION NUCLEON CHARGE EXCHANGE FROM 160 TO 500 MEV
LAMPF-066	NEUTRON-PROTON POLARIZATION MEASUREMENTS WITH A POLARIZED TARGET; PHASE II, THE N-P SPIN CORRELATION OBSERVABLE, C/NN(THETA)
LAMPF-085	GAMMA-NEUTRINO CORRELATION AFTER NEGATIVE-MUON CAPTURE
LAMPF-131	A STUDY OF THE $\pi^+ d \rightarrow p p$ REACTION AT PION ENERGIES 10-60 MEV
LAMPF-190	A PRECISION MEASUREMENT OF THE PI-/PIO MASS DIFFERENCE
LAMPF-194	PROTON-PROTON D, R, AND A MEASUREMENTS
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LAMPF-295	STUDY OF THE PION-DEUTERON SINGLE CHARGE-EXCHANGE REACTION $D(\pi^-, \pi^0)2N$
LAMPF-336	STUDY OF THE SPIN DEPENDENCE OF PROTON-PROTON PION PRODUCTION REACTIONS
LAMPF-337	MEASUREMENT OF THE CROSS SECTION FOR $\pi^- p \rightarrow \pi^- \pi^+ n$ AT 200 AND 229 MEV
LAMPF-358	ELASTIC SCATTERING OF PIONS FROM DEUTERIUM
LAMPF-360	THE MEASUREMENT OF THE POLARIZATION TRANSFER COEFFICIENTS D/T AND A'/T AT 800 MEV FOR THE REACTIONS $D(p,n)2P$ , $Li6(p,n)Be6$ , AND $Be9(p,n)B9$
LAMPF-363	MEASUREMENTS OF PI+ P AND PI- P ELASTIC SCATTERING
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LAMPF-392	A MEASUREMENT OF THE TRIPLE-SCATTERING PARAMETERS D, R, A, R', AND A' FOR PROTON-PROTON AND PROTON-NEUTRON SCATTERING AT 800 MEV
LAMPF-400-445	SEARCH FOR THE RARE DECAY $\mu^+ \rightarrow e^+ e^-$ , AND SEARCH FOR THE LEPTON FLAVOR-VIOLATING DECAY $\mu^+ \rightarrow e^+ \gamma$
LAMPF-402	A MEASUREMENT OF THE POLARIZATION TRANSFER COEFFICIENTS D/T(0 DEG) AND A'/T(0 DEG) IN THE REACTION $p p \rightarrow n x$ AT 800 MEV
LAMPF-403	A MEASUREMENT OF THE TRIPLE-SCATTERING PARAMETER D/T FOR THE CHARGE-EXCHANGE REGION IN N P SCATTERING
LAMPF-421	SENSITIVE SEARCH FOR $\mu^- \rightarrow e^-$ CONVERSION
LAMPF-444	SEARCH FOR THE DECAY $\mu^0 \rightarrow e^- \gamma$
LAMPF-455	HIGH-PRECISION STUDY OF THE $\mu^+$ DECAY SPECTRUM
LAMPF-457	MEASUREMENT OF THE QUASI-FREE P N AND P P AND FREE P P ANALYZING POWERS, 500-800 MEV
LAMPF-462	ANALYZING POWER AND DIFFERENTIAL CROSS SECTIONS FOR THE REACTIONS $p p \rightarrow d \pi^+$ AND $p d \rightarrow t \pi^+$ AT ABOUT 600 MEV AND 400 MEV
LAMPF-478	$\pi^+$ AND $\pi^-$ ELASTIC SCATTERING FROM DEUTERIUM
LAMPF-492	POLARIMETER CALIBRATIONS AND SEARCH FOR ENERGY-DEPENDENT STRUCTURE IN P P ELASTIC SCATTERING VIA CROSS SECTION, ANALYZING POWER, AND WOLFENSTEIN PARAMETER MEASUREMENTS
LAMPF-498	MEASUREMENTS OF LONGITUDINAL CROSS SECTION DIFFERENCE FOR LONGITUDINAL POLARIZED BEAM AND TARGET; $\Delta\Sigma/L$ FOR (1) P P, (2) P DEUT, AND (3) N P.
LAMPF-504	MEASUREMENT OF THE TOTAL CROSS SECTION DIFFERENCE FOR PROTON-PROTON AND PROTON-NEUTRON SCATTERING IN PURE TRANSVERSE INITIAL SPIN STATES IN THE 400-800 MEV REGION
LAMPF-508	DIBARYON RESONANCES IN PION PRODUCTION
LAMPF-517	POLARIZED BEAM AND TARGET EXPERIMENTS IN THE P P SYSTEM. PHASE I. A/Y AND A/Y Y FOR THE D $\pi^+$ CHANNEL AND A/Y Y FOR THE ELASTIC CHANNEL FROM 500 TO 800 MEV
LAMPF-518	POLARIZED BEAM AND TARGET EXPERIMENTS IN THE P P SYSTEM; PHASE II. MEASUREMENTS OF A/ZZ AND A/XZ FOR THE D $\pi^+$ CHANNEL AND FOR THE ELASTIC CHANNEL FROM 500 TO 800 MEV
LAMPF-546	INVESTIGATION OF THE SPIN FORM FACTOR OF TRITIUM AND HELIUM-THREE
LAMPF-563	P P ELASTIC SCATTERING AT 800 AND 500 MEV
LAMPF-567	A STUDY OF THE $\pi^+ d \rightarrow p p$ REACTION AT PION ENERGIES 5-200 MEV
LAMPF-581	$\pi^+$ ELASTIC SCATTERING FROM DEUTERIUM AT 237 MEV
LAMPF-585	MEASUREMENT OF P P AND P D ELASTIC SCATTERING IN THE COULOMB INTERFERENCE REGION BETWEEN 500 AND 800 MEV
LAMPF-589	FREE-FORWARD N P ELASTIC-SCATTERING ANALYZING POWER MEASUREMENTS AT 800 MEV
LAMPF-590	MEASUREMENT OF D(THETA) IN P N AND N P SCATTERING AT 800, 650 MEV AND OTHER ENERGIES WITH ASSOCIATED P P MEASUREMENTS
LAMPF-605	A DIBARYON SEARCH AT EPICS
LAMPF-634	MEASUREMENT OF PARITY VIOLATION IN THE P-NUCLEON TOTAL CROSS SECTIONS AT 800 MEV
LAMPF-635	SPIN MEASUREMENTS IN P D ELASTIC SCATTERING
LAMPF-636	A MEASUREMENT OF THE WOLFENSTEIN POLARIZATION PARAMETERS D/LL, D/SL, K/LL, AND K/SL FOR P P ELASTIC SCATTERING
LAMPF-637	A MEASUREMENT OF THE VECTOR POLARIZATION OF THE DEUTERON IN THE REACTION $p p \rightarrow d \pi^+$
LAMPF-638	A SEARCH FOR OSCILLATIONS USING MUON NEUTRINOS
LAMPF-645	A SEARCH FOR NEUTRINO OSCILLATIONS AT LAMPF
LAMPF-647	A NEUTRON OSCILLATION EXPERIMENT AT LAMPF
LAMPF-650	A SEARCH FOR NEUTRINO MIXING VIA NONEXPONENTIAL $\pi^- \rightarrow \mu^- \nu$ DECAY
LAMPF-651	MEASUREMENT OF A LOWER LIMIT FOR THE SUBTHRESHOLD PRODUCTION OF KAONS WITH 800-MEV PROTONS
LAMPF-664	THE MEASUREMENT OF THE POLARIZATION TRANSFER COEFFICIENTS A'/T AND D/T AT 500, 650, AND 800 MEV FOR THE REACTION $d(p, n)2p$
LAMPF-665	THE MEASUREMENT OF THE INITIAL STATE SPIN CORRELATION PARAMETERS C/LL AND C/SL IN N P ELASTIC SCATTERING AT 500, 650, AND 800 MEV
LAMPF-682	SEARCH FOR DIBARYON RESONANCES IN THE REACTION $\pi^- d \rightarrow p \pi^- n$ AT PLAB 200 TO 600 MEV/C
LAMPF-683	MEASUREMENT OF $\Delta\Sigma/L$ IN FREE NEUTRON-PROTON SCATTERING AT 500, 650, AND 800 MEV
LAMPF-685	SPIN CORRELATIONS IN THE REACTION $p(d, d)p$ AT 500 MEV
LAMPF-689	A. NEUTRON COUNTER CALIBRATION USING TAGGED NEUTRONS FROM THE REACTION $\pi^- d \rightarrow n n$ , AND B. FEASIBILITY STUDY; MEASUREMENTS OF THE DIFFERENTIAL CROSS SECTION FOR $\pi^- d \rightarrow n n$ TO TEST CHARGE SYMMETRY AND ISOSPIN INVARIANCE
LAMPF-708	A MEASUREMENT OF THE DEPOLARIZATION, THE POLARIZATION, AND THE POLARIZATION ROTATION PARAMETERS AND THE ANALYZING POWER FOR THE REACTION $p p \rightarrow p \pi^+ n$
LAMPF-726	SEARCH FOR THE C-NONINVARIANT DECAY $\pi^0 \rightarrow 3 \gamma$
LAMPF-758	TO CATCH A DEMON
P-DECAY-FREJUS	NUCLEON DECAY EXPERIMENT WITH A MODULAR FLASH CHAMBER DETECTOR
P-DECAY-HOMESTAK	THE HOMESTAKE GOLD MINE EXPERIMENT
P-DECAY-HPW	THE UTAH MINE EXPERIMENT
P-DECAY-IMB	THE IRVINE-MICHIGAN-BROOKHAVEN EXPERIMENT
P-DECAY-KAMIOKA	KEK-(UT) EXPERIMENT ON PROTON DECAY
P-DECAY-KGF	THE KOLAR GOLD FIELD EXPERIMENT
P-DECAY-NUSEX	THE MONT BLANC EXPERIMENT
P-DECAY-SOUDAN-2	THE SOUDAN II EXPERIMENT
SERP-E-045	STUDY OF MUON CHARACTERISTICS IN NEUTRINO INTERACTIONS
SERP-E-091	STUDY OF CHARGE-EXCHANGE MESON SCATTERING PROCESSES ON NUCLEONS IN MOMENTUM RANGE $< 20$ GEV/C
SERP-E-092	MEASUREMENT OF LAMBDA MAGNETIC MOMENT
SERP-E-100	STUDY OF LARGE PT PARTICLE PRODUCTION IN P NUCLEON COLLISIONS AT 70 GEV
SERP-E-102	STUDY OF HYPERCHARGE EXCHANGE SCATTERING PROCESSES
SERP-E-104	SEARCH FOR CHARM
SERP-E-105	STUDY OF HADRON INTERACTIONS IN ENERGY RANGE 20-40 GEV
SERP-E-107	STUDY OF NEUTRINO AND ANTINEUTRINO INTERACTIONS WITH NUCLEI
SERP-E-111	SEARCH FOR NEW SHORT-LIVED PARTICLES IN NEUTRINO INTERACTIONS BY PHOTOEMULSION
SERP-E-112	POLARIZATION MEASUREMENT IN CHARGE-EXCHANGE REACTIONS AT 40 GEV/C
SERP-E-115	STUDY OF CHARGED PARTICLE RARE DECAYS
SERP-E-116	STUDY OF CHARGE-EXCHANGE REACTIONS AT SMALL MOMENTUM TRANSFER
SERP-E-119	RELATIVISTIC POSITRONIUM PHYSICS
SERP-E-120	EXPERIMENTS WITH HYPERON BEAMS
SERP-E-121	SEARCH FOR DECAY OF PARTICLES WITH MEAN LIFETIMES $10^{**}(-11)$ TO $10^{**}(-12)$ SEC
SERP-E-127	STUDY OF HADRON ATOMS AND ELEMENTARY PARTICLE PROPERTIES USING A CRYSTAL-DIFFRACTION SPECTROMETER AT THE SERPUKHOV PROTON SYNCHROTRON
SERP-E-130	LIQUID ARGON DETECTOR FOR HADRONS AND GAMMAS
SERP-E-132	INVESTIGATION OF POSSIBILITY OF BENDING AND COOLING OF BEAMS BY SINGLE CRYSTALS. DESIGN OF NEW TYPE DETECTORS FOR CHARGED PARTICLES
SERP-E-133	PROPOSAL TO EXTEND THE 32 GEV/C $K^+$ P EXPERIMENT ON THE MIRABELLE BUBBLE CHAMBER UP TO 1 MILLION PICTURES
SERP-E-134	STUDY OF RARE ELECTROMAGNETIC DECAYS OF MESONS
SERP-E-135	CROSS SECTION MEASUREMENT OF INCLUSIVE $\psi(3700)$ PRODUCTION ON NUCLEI AND $J/\psi$ PRODUCTION ON P
SERP-E-136	NEUTRINO DETECTOR
SERP-E-138	STUDY OF MULTIPARTICLE AP P INTERACTIONS AT 32 GEV/C WITH STATISTICS OF 10 EVENTS/MICROBARN IN MIRABELLE
SERP-E-139	STUDY OF ANTIDUTERON-PROTON AND ANTIDUTERON-DEUTERON INTERACTIONS IN LUDMILLA
SERP-E-140	STUDY OF CHARGE-EXCHANGE REACTIONS AND SEARCH FOR NEW PARTICLES
SERP-E-142	INVESTIGATIONS OF ELECTROMAGNETIC DECAYS OF MESONS
SERP-E-143	STUDY OF THE PION STRUCTURE IN THE RADIATIVE SCATTERING REACTION ON NUCLEI
SERP-E-144	MEASUREMENTS OF THE SLOW ANTI-PROTON YIELD IN 70 GEV PROTON INTERACTIONS

## LIST OF EXPERIMENTS AND TITLES

EXPERIMENT	TITLE
SERP-E-146	SEARCH FOR NARROW BARYON RESONANCES IN HIGH ENERGY NEUTRON DIFFRACTIVE SCATTERING
SERP-E-147	STUDY OF REACTIONS WITH STRANGE PARTICLE PRODUCTION IN THE $\pi^-$ MESON BEAM OF THE IHEP ACCELERATOR
SERP-E-148	STUDY OF EXCLUSIVE RESONANCE PRODUCTION IN RARE PROCESSES IN SIGMA-M
SERP-E-150	AN ADDITION TO EXPERIMENT E-138 WITH A PROGRAM OF P P AND P DEUTERON INVESTIGATIONS AT 32 GEV/C
SIN-R-71-07	P P ELASTIC SCATTERING BETWEEN 400 AND 600 MEV
SIN-R-71-08	PRECISION MEASUREMENT OF THE MUON MOMENTUM IN PION DECAY AT REST
SIN-R-71-12	DETERMINATION OF AN UPPER LIMIT OF THE NUMU MASS FROM PION DECAY IN FLIGHT
SIN-R-72-02	EXPERIMENTS WITH NEUTRON BEAMS
SIN-R-73-01-2	ENERGY AND ANGLE DEPENDENCE OF THE TENSOR POLARIZATION T20 IN $\pi^-$ D ELASTIC SCATTERING
SIN-R-74-05	ELECTRON POLARIZATION IN MUON DECAY
SIN-R-75-07-2	MEASUREMENT OF THE P PARAMETER IN $\pi^-$ P ELASTIC AND CHARGE EXCHANGE SCATTERING
SIN-R-77-01	STUDY OF ANGULAR CORRELATIONS IN THE REACTIONS $C^{12}(\mu^-, \nu)B^{12}$ (G.S.) AND $O^{16}(\mu^-, \nu)N^{16}$ (G.S.)
SIN-R-78-02	MEASUREMENT OF CROSS SECTIONS FOR THE PRODUCTION OF CHARGED PIONS BY 590 MEV PROTONS
SIN-R-78-05-4	MEASUREMENT OF THE AXZ PARAMETER IN THE REACTION $P P \rightarrow \pi^+ D$
SIN-R-78-06	MEASUREMENT OF THE REACTION $P$ (POLARIZED) $P$ (POLARIZED) $\rightarrow \pi^+ D$ AT 580 MEV
SIN-R-78-13-1	STUDY OF THE RADIATIVE DECAY OF THE PION
SIN-R-78-15-1	MEASUREMENT OF THE 2P-2S ENERGY DIFFERENCE IN MUONIC HYDROGEN
SIN-R-78-18	DETERMINATION OF THE VECTOR ANALYZING POWER IN $\pi^-$ D SCATTERING
SIN-R-79-05	SPECIAL REACTION CHANNELS OF $\pi^+$ AND $\pi^-$ ABSORPTION IN LIGHT NUCLEI
SIN-R-79-07	THE STUDY OF THE REACTION $\pi^+ D \rightarrow P P$ WITH A VECTOR POLARIZED D TARGET
SIN-R-80-01	MEASUREMENT OF CROSS SECTIONS WITH A BEAM OF POLARIZED PROTONS AND A POLARIZED TARGET
SIN-R-80-11	SEARCH FOR ADMIXTURE OF HEAVY NEUTRINOS IN $\pi^+ \rightarrow \mu^+ \text{NUMU}$ DECAY
SIN-R-81-01	EXPERIMENTAL DETERMINATION OF THE STRONG INTERACTION SHIFT IN THE 2P-1S TRANSITION OF PIONIC HYDROGEN AND DEUTERIUM ATOMS
SIN-R-81-02	STUDY OF THE FORMATION OF MUONIC ATOMS IN LOW Z GASEOUS MATERIALS IN A CYCLOTRON TRAP
SIN-R-81-09	SEARCH FOR HEAVY NEUTRINOS IN $\pi^- \rightarrow e \nu$ DECAY
SIN-R-82-01	SEARCH FOR AN ADMIXTURE OF HEAVY NEUTRINOS IN THE DECAY OF PIONS AT REST
SIN-R-82-03-1	MEASUREMENT OF THE LIFETIME OF THE 2S STATE OF MUONIC HELIUM AT GAS PRESSURES BELOW 5 ATM
SIN-R-82-06	SPIN TRANSFER PARAMETERS IN THE PROTON-PROTON INELASTIC CHANNELS
SIN-Z-75-02	PARITY VIOLATION IN P P SCATTERING
SIN-Z-80-01	PARITY VIOLATION IN P ALPHA SCATTERING
SLAC-BC-067	$\pi^+$ P INTERACTIONS USING THE LEAD-GLASS WALL
SLAC-BC-068	SEARCH FOR EXOTIC MESONS PRODUCED IN ANTI-PROTON-NUCLEON INTERACTIONS
SLAC-BC-070	SEARCH FOR MANIFESTLY EXOTIC STATES WITH STRANGENESS IN PBAR-DEUTERIUM INTERACTIONS AT 9 GEV/C
SLAC-BC-072	STUDY OF CHARM PHOTOPRODUCTION IN THE SHF EXPOSED TO A POLARIZED MONO-ENERGETIC BACKSCATTERED LASER BEAM OF 20 GEV PHOTONS
SLAC-BC-073	MEASUREMENT OF LIFETIME AND OTHER PROPERTIES OF CHARMED PARTICLES
SLAC-E-130	PRECISE MEASUREMENTS OF ASYMMETRIES IN DEEP INELASTIC SCATTERING OF POLARIZED ELECTRONS BY POLARIZED PROTONS AND BY POLARIZED DEUTERONS
SLAC-E-133	MEASUREMENT OF THE ELASTIC ELECTRON-NEUTRON CROSS SECTION AT HIGH $Q^{*2}$
SLAC-E-135	COMPARISON OF $K^-$ P AND $K^+$ P INTERACTIONS, AND A PROGRAMMATIC STUDY OF STRANGE QUARK SPECTROSCOPY
SLAC-E-136	ELASTIC ELECTRON-PROTON CROSS SECTIONS AT LARGE MOMENTUM TRANSFER
SLAC-E-137	SEARCH FOR LOW MASS, METASTABLE NEUTRAL PARTICLES AT SLAC
SLAC-PEP-002	SEARCH FOR HIGHLY IONIZING PARTICLES AT PEP
SLAC-PEP-004	A PEP FACILITY BASED ON THE TIME PROJECTION CHAMBER
SLAC-PEP-005	A GENERAL SURVEY OF PARTICLE PRODUCTION AT PEP
SLAC-PEP-006	A LEPTON TOTAL ENERGY DETECTOR AT PEP
SLAC-PEP-009	A PEP FORWARD DETECTOR FACILITY
SLAC-PEP-012	A HIGH RESOLUTION SPECTROMETER AT PEP
SLAC-PEP-014	A SEARCH FOR FREE QUARKS AT PEP
SLAC-PEP-020	DELCO AT PEP
SLAC-SP-024	A PROPOSAL FOR A LARGE SOLID ANGLE NEUTRAL DETECTOR FOR SPEAR 2 (THE CRYSTAL BALL)
SLAC-SP-029	STUDIES OF THE ECM = 3-8 GEV REGION USING THE MARK II DETECTOR AT SPEAR
SLAC-SP-030	A LARGE SOLID ANGLE NEUTRAL DETECTOR FOR SPEAR II (THE CRYSTAL BALL)
SLAC-SP-031	CHECKOUT OF MARK III DETECTOR AT SPEAR
SLAC-SP-032	STUDIES OF THE WEAK DECAYS OF D MESONS AT THE $\Psi(3770)$ RESONANCE
TRI-052	A NEW MEASUREMENT OF THE $\pi^- \rightarrow e \nu$ BRANCHING RATIO -- A TEST OF THE STANDARD MODEL
TRI-074	PROPOSAL TO MEASURE D, R, AND R' IN P P SCATTERING, 200 TO 525 MEV
TRI-104	SEARCH FOR MUON-ELECTRON CONVERSION AT TRIUMF
TRI-121	TEST OF CHARGE-SYMMETRY IN N P SCATTERING
TRI-137	LIFETIME OF THE POSITIVE MUON
TRI-168-197	2S MUONIUUM PRODUCTION FROM THIN FOILS
TRI-171	TEST OF T-INVARIANCE IN P P SCATTERING
TRI-174	SPIN DEPENDENCE OF THE $P P \rightarrow P N \pi^+$ REACTION
TRI-176-134	MEASUREMENT OF THE PARAMETER XI IN THE MUON DECAY
TRI-181	MEASUREMENT OF THE 1S STRONG INTERACTION SHIFT IN PIONIC HYDROGEN
TRI-185	PRECISE MEASUREMENT OF THE POLARIZATION PARAMETER XI; A SEARCH FOR THE EFFECTS OF A RIGHT-HANDED GAUGE BOSON IN $\mu^+$ DECAY
TRI-190	RADIATIVE POLARIZED NEUTRON CAPTURE ON PROTONS
TRI-192	MEASUREMENT OF THE PION PRODUCTION ASYMMETRIES FROM REACTION $P P \rightarrow \text{DEUT } \pi^+$ WITH A POLARIZED PROTON BEAM AT ENERGIES 400-520 MEV
TRI-205	TENSOR ANALYZING POWER IN PION DEUTERIUM SCATTERING
TRI-217	LOW ENERGY, ELECTROMAGNETIC PION FORM FACTORS

## BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
GAMMA P	<1.3	INS-15-2	NUMU NUCLEUS	0. 230.0	FNAL-594
GAMMA P	<200.0	CERN-NA-014	NUMU NUCLEUS	0. 260.0	CERN-WA-018
GAMMA P	0.6 1.1	INS-15-1	NUMU NUCLEUS	0.5 1.5	CERN-PS-181
GAMMA P	0.8 1.0	INS-14-3	NUMU NUCLEUS	0.5 3.0	CERN-PS-180
GAMMA P	1.2	INS-17-1	NUMU NUCLEUS	5.0 20.0	SERP-E-111
GAMMA P	20.0	SLAC-BC-072	NUMU NUCLEUS	10.0 20.0	SERP-E-107
GAMMA P	20.0	SLAC-BC-073	NUMU NUCLEUS	10.0 100.0	CERN-WA-059
GAMMA P	20.0 70.0	CERN-WA-057	NUMU NUCLEUS	10.0 100.0	FNAL-531
GAMMA P	70.0 140.0	FNAL-516	NUMU NUCLEUS	10.0 100.0	FNAL-564
GAMMA P	70.0 200.0	CERN-WA-069	NUMU NUCLEUS	10.0 200.0	CERN-WA-047
GAMMA P	80.0 140.0	FNAL-612	NUMU NUCLEUS	10.0 200.0	FNAL-545
GAMMA P	>100.0	CERN-NA-024	NUMU NUCLEUS	10.0 250.0	FNAL-636
GAMMA N	0.5 0.9	INS-14-4	NUMU NUCLEUS	10.0 400.0	FNAL-632
GAMMA NUCLEON	10.0 180.0	CERN-NA-001	NUMU NUCLEUS	20.0 600.0	FNAL-652
GAMMA DEUT	<1.2	INS-18-3	NUMU NUCLEUS	25.0	CERN-WA-022
GAMMA DEUT	0.3 0.6	INS-16-1	NUMU NUCLEUS	25.0 250.0	FNAL-616
GAMMA DEUT	0.4 0.8	INS-15-3	NUMU NUCLEUS	>60.0	FNAL-553
GAMMA BE	40.0 200.0	FNAL-401	NUMU NUCLEUS	65.0	CERN-WA-022
GAMMA NUCLEUS	0. 300.0	FNAL-458	NUMU NUCLEUS	200.0	CERN-WA-022
GAMMA NUCLEUS	0.2 0.6	INS-14-2	NUMU	?	FNAL-356
GAMMA NUCLEUS	0.2 0.5	INS-17-2	NUMU	5.3E-02	LAMPF-645
GAMMA NUCLEUS	0.2 0.5	INS-18-1	NUMU	0. 4.0	BNL-775
GAMMA NUCLEUS	0.2 1.0	INS-16-2	NUMU	0. 7.0	BNL-776
GAMMA NUCLEUS	0.4 0.8	INS-15-3	NUMU	6.0E-02 0.2	LAMPF-638
GAMMA NUCLEUS	0.7 1.0	INS-15-4	NUMU	0.5 3.0	CERN-PS-169
GAMMA NUCLEUS	10.0 180.0	CERN-NA-001	ANUMU E-	0. 12.0	BNL-734
GAMMA NUCLEUS	20.0 80.0	CERN-WA-058	ANUMU E-	0. 200.0	FNAL-180
GAMMA NUCLEUS	200.0 500.0	FNAL-687	ANUMU E-	0. 230.0	FNAL-594
			ANUMU E-	0. 260.0	CERN-WA-018
			ANUMU E-	10.0 100.0	FNAL-253
			ANUMU P	0. 12.0	BNL-734
			ANUMU P	0. 150.0	CERN-WA-021
			ANUMU P	0. 200.0	FNAL-180
			ANUMU P	0. 230.0	FNAL-594
			ANUMU P	0. 260.0	CERN-WA-001
			ANUMU P	2.0 30.0	CERN-WA-025
			ANUMU P	28.0 43.0	SERP-E-045
			ANUMU P	35.0 64.0	FNAL-388
			ANUMU P	50.0 150.0	FNAL-380
			ANUMU P	91.0 95.0	FNAL-388
			ANUMU P	131.0 143.0	FNAL-388
			ANUMU N	0. 12.0	BNL-734
			ANUMU N	0. 200.0	FNAL-180
			ANUMU N	0. 260.0	CERN-WA-025
			ANUMU NUCLEON	10.0 600.0	FNAL-649
			ANUMU DEUT	0. 100.0	FNAL-390
			ANUMU DEUT	0. 260.0	CERN-WA-001
			ANUMU DEUT	0. 260.0	CERN-WA-025
			ANUMU NE	10.0 200.0	FNAL-646
			ANUMU NE	28.0 43.0	FNAL-388
			ANUMU NE	35.0 64.0	FNAL-388
			ANUMU NE	50.0 150.0	FNAL-380
			ANUMU NE	91.0 95.0	FNAL-388
			ANUMU NE	131.0 143.0	FNAL-388
			ANUMU AL	2.0 30.0	SERP-E-045
			ANUMU FE	0. 260.0	CERN-WA-001
			ANUMU FE	0. 260.0	CERN-WA-018
			ANUMU FE	2.0 30.0	SERP-E-045
			ANUMU NUCLEUS	0. 6.0	CERN-PS-167
			ANUMU NUCLEUS	0. 6.0	CERN-PS-168
			ANUMU NUCLEUS	0. 230.0	FNAL-594
			ANUMU NUCLEUS	0. 260.0	CERN-WA-018
			ANUMU NUCLEUS	5.0 20.0	SERP-E-111
			ANUMU NUCLEUS	10.0 20.0	SERP-E-107
			ANUMU NUCLEUS	10.0 100.0	CERN-WA-059
			ANUMU NUCLEUS	10.0 100.0	FNAL-531
			ANUMU NUCLEUS	10.0 100.0	FNAL-564
			ANUMU NUCLEUS	10.0 200.0	CERN-WA-047
			ANUMU NUCLEUS	10.0 400.0	FNAL-632
			ANUMU NUCLEUS	20.0 600.0	FNAL-652
			ANUMU NUCLEUS	25.0 250.0	FNAL-616
			ANUMU NUCLEUS	>60.0	FNAL-553
			ANUMU	?	FNAL-356
			ANUMU	5.3E-02	LAMPF-645
			ANUMU	6.0E-02 0.2	LAMPF-638
			NUTAU NE	10.0 200.0	FNAL-646
			NUTAU NUCLEUS	10.0 250.0	FNAL-636
			ANUTAU NE	10.0 200.0	FNAL-646
			E- P	?	SLAC-E-133
			E- P	6.4	SLAC-E-130
			E- P	14.0	SLAC-E-136
			E- P	16.2	SLAC-E-130
			E- P	21.0	SLAC-E-136
			E- P	22.6	SLAC-E-130
			E- P	28.5	SLAC-E-136
			E- N	?	SLAC-E-133
			E- DEUT	?	SLAC-E-133
			E- DEUT	6.4	SLAC-E-130
			E- DEUT	16.2	SLAC-E-130
			E- DEUT	22.6	SLAC-E-130
			E- NUCLEUS	20.0	SLAC-E-137
			E-	1.0 10.0	CERN-PS-188
			E-	5.0 20.0	CERN-WA-064

MOMENTUM RANGES FOR NEUTRINO AND ANTINEUTRINO BEAMS ARE NOT DEFINED VERY SYSTEMATICALLY.

NU NE	10.0 200.0	FNAL-646
NUE E-	2.0E-02 5.3E-02	LAMPF-225
NUE E-	10.0 100.0	FNAL-253
NUE E-	10.0 200.0	FNAL-646
NUE NE	10.0 200.0	FNAL-646
NUE NUCLEUS	0.5 3.0	CERN-PS-180
NUE NUCLEUS	10.0 250.0	FNAL-636
NUE	0. 5.3E-02	LAMPF-645
ANUE E-	0. 230.0	FNAL-594
ANUE E-	10.0 100.0	FNAL-253
ANUE E-	10.0 200.0	FNAL-646
ANUE P	0. 5.3E-02	LAMPF-645
ANUE DEUT	4.0E-02	LAMPF-031
ANUE NE	10.0 200.0	FNAL-646
ANUE AL	2.0 30.0	SERP-E-045
ANUMU E-	0. 12.0	BNL-734
ANUMU E-	0. 150.0	CERN-WA-021
ANUMU E-	0. 200.0	FNAL-053A
ANUMU E-	0. 230.0	FNAL-594
ANUMU E-	0. 260.0	CERN-WA-018
ANUMU E-	2.0 30.0	SERP-E-045
ANUMU E-	10.0 100.0	FNAL-253
ANUMU P	0. 10.0	BNL-737
ANUMU P	0. 12.0	BNL-734
ANUMU P	0. 150.0	CERN-WA-021
ANUMU P	0. 200.0	FNAL-053A
ANUMU P	0. 260.0	CERN-WA-001
ANUMU P	0. 260.0	CERN-WA-025
ANUMU P	10.0 200.0	FNAL-545
ANUMU P	28.0 43.0	FNAL-388
ANUMU P	35.0 64.0	FNAL-388
ANUMU P	50.0 150.0	FNAL-380
ANUMU P	91.0 95.0	FNAL-388
ANUMU P	131.0 143.0	FNAL-388
ANUMU N	0. 0.2	BNL-704
ANUMU N	0. 0.4	BNL-706
ANUMU N	0. 10.0	BNL-737
ANUMU N	0. 12.0	BNL-734
ANUMU N	0. 230.0	FNAL-594
ANUMU N	0. 260.0	CERN-WA-025
ANUMU N	2.0 30.0	SERP-E-045
ANUMU N	10.0 200.0	FNAL-545
ANUMU NUCLEON	10.0 200.0	FNAL-545
ANUMU NUCLEON	10.0 600.0	FNAL-649
ANUMU DEUT	0. 10.0	BNL-737
ANUMU DEUT	0. 260.0	CERN-WA-001
ANUMU DEUT	0. 260.0	CERN-WA-025
ANUMU C12	0. 0.2	BNL-704
ANUMU NE	0. 200.0	FNAL-053A
ANUMU NE	10.0 200.0	FNAL-646
ANUMU NE	28.0 43.0	FNAL-388
ANUMU NE	35.0 64.0	FNAL-388
ANUMU NE	50.0 150.0	FNAL-380
ANUMU NE	91.0 95.0	FNAL-388
ANUMU NE	131.0 143.0	FNAL-388
ANUMU AL	2.0 30.0	SERP-E-045
ANUMU FE	0. 260.0	CERN-WA-001
ANUMU FE	2.0 30.0	SERP-E-045
ANUMU FE	30.0 230.0	FNAL-701
ANUMU PB	0. 200.0	CERN-WA-044
ANUMU NUCLEUS	0. 6.0	CERN-PS-167
ANUMU NUCLEUS	0. 6.0	CERN-PS-168



## BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
FOR E <sup>+</sup> E <sup>-</sup> COLLIDING BEAM EXPERIMENTS, WE GIVE THE CENTER-OF-MASS (=LAB) MOMENTA RATHER THAN THE EQUIVALENT LAB MOMENTUM FOR SCATTERING ON A STATIONARY TARGET.					
E+ E-	?	SLAC-SP-031	PI+ P	300.0	CERN-WA-070
E+ E-	<30.0	KEK-TR-001	PI+ P	400.0	FNAL-609
E+ E-	<30.0	KFK-TR-002	PI+ P	450.0	CERN-WA-070
E+ E-	0.2	CERN-NA-007	PI+ N	5.0	SERP-E-102
E+ E-	0.2	CERN-NA-007	PI+ N	20.0	CERN-WA-056
E+ E-	0.2	CERN-NA-007	PI+ DEUT	7.7E-02	LAMPF-388
E+ E-	0.2	CERN-NA-007	PI+ DEUT	8.7E-02	LAMPF-388
E+ E-	1.5	4.0	PI+ DEUT	9.6E-02	LAMPF-388
E+ E-	1.5	4.2	PI+ DEUT	0.1	LAMPF-388
E+ E-	1.5	4.2	PI+ DEUT	0.1	LAMPF-131
E+ E-	1.5	4.2	PI+ DEUT	0.1	LAMPF-388
E+ E-	1.8	SLAC-SP-032	PI+ DEUT	0.1	LAMPF-388
E+ E-	1.9	SLAC-SP-032	PI+ DEUT	0.1	LAMPF-131
E+ E-	3.7	5.8	PI+ DEUT	0.1	LAMPF-388
E+ E-	4.0	18.0	PI+ DEUT	0.2	LAMPF-567
E+ E-	4.0	18.0	PI+ DEUT	0.2	LAMPF-567
E+ E-	4.0	18.0	PI+ DEUT	0.2	TRI-205
E+ E-	4.0	18.0	PI+ DEUT	0.2	LAMPF-567
E+ E-	4.0	18.0	PI+ DEUT	0.2	LAMPF-682
E+ E-	4.0	18.0	PI+ DEUT	0.2	LAMPF-567
E+ E-	4.0	18.0	PI+ DEUT	0.2	LAMPF-567
E+ E-	4.5	5.8	PI+ DEUT	0.2	SIN-R-73-01-2
E+ E-	4.5	8.0	PI+ DEUT	0.2	LAMPF-567
E+ E-	4.7	5.8	PI+ DEUT	0.2	SIN-R-78-18
E+ E-	4.7	DESY-CRYSTAL-BAL	PI+ DEUT	0.2	LAMPF-478
E+ E-	5.0	20.0	PI+ DEUT	0.3	SIN-R-79-07
E+ E-	5.0	20.0	PI+ DEUT	0.3	LAMPF-605
E+ E-	5.0	20.0	PI+ DEUT	0.3	SIN-R-78-18
E+ E-	5.0	20.0	PI+ DEUT	0.3	LAMPF-581
E+ E-	5.0	20.0	PI+ DEUT	0.3	LAMPF-581
E+ E-	6.0	15.0	PI+ DEUT	0.4	SIN-R-78-18
E+ E-	6.0	16.0	PI+ DEUT	0.4	SIN-R-78-18
E+ E-	14.5	SLAC-PEP-014	PI+ DEUT	0.4	LAMPF-358
E+ E-	17.5	DESY-PETRA-PLU-2	PI+ DEUT	0.4	SIN-R-78-18
E+	1.0	10.0	PI+ DEUT	0.4	LAMPF-358
E+	5.0	20.0	PI+ DEUT	0.4	SIN-R-78-18
MU- P	0.	SIN-R-78-15-1	PI+ DEUT	0.5	KEK-083
MU- P	120.0	280.0	PI+ DEUT	0.5	LAMPF-358
MU- P	120.0	280.0	PI+ DEUT	0.6	LAMPF-358
MU- HE	0.	BNL-745	PI+ DEUT	0.7	KEK-081
MU- HE	0.	SIN-R-82-03-1	PI+ DEUT	1.0	CERN-PS-159
MU- C12	6.5E-02	SIN-R-77-01	PI+ DEUT	1.5	KEK-081
MU- FE	600.0	FNAL-640	PI+ DEUT	5.0	SERP-E-091
MU- NUCLEUS	0.	LAMPF-085	PI+ DEUT	300.0	FNAL-705
MU- NUCLEUS	0.	LAMPF-421	PI+ HE3	0.	SIN-R-79-05
MU- NUCLEUS	0.	TRI-104	PI+ HE3	0.2	LAMPF-546
MU- NUCLEUS	0.	SIN-R-81-02	PI+ HE3	0.3	LAMPF-546
MU- NUCLEUS	0.2	CERN-NA-004	PI+ TRIT	0.2	LAMPF-546
MU- NUCLEUS	100.0	250.0	PI+ TRIT	0.3	LAMPF-546
MU+ AL	?	TRI-168-197	PI+ C	530.0	FNAL-706
MU+ FE	600.0	BNL-754	PI+ NE	30.0	CERN-WA-051
MU+	0.	FNAL-640	PI+ NE	64.0	CERN-WA-051
MU+	0.	LAMPF-031	PI+ MG	100.0	FNAL-597
MU+	0.	LAMPF-400-445	PI+ AU	100.0	FNAL-597
MU+	0.	LAMPF-444	PI+ NUCLEUS	0.8	BNL-692
MU+	0.	LAMPF-455	PI+ NUCLEUS	1.0	BNL-758
MU+	0.	TRI-137	PI+ NUCLEUS	20.0	CERN-WA-035
MU+	0.	TRI-176-134	PI+ NUCLEUS	30.0	CERN-WA-072
MU+	0.	TRI-185	PI+ NUCLEUS	75.0	FNAL-615
MU+	3.0E-02	SIN-R-74-05	PI+ NUCLEUS	100.0	CERN-WA-010
MUON P	750.0	FNAL-665	PI+ NUCLEUS	150.0	CERN-WA-003
MUON NUCLEUS	280.0	CERN-NA-028	PI+ NUCLEUS	200.0	CERN-NA-003
MUON NUCLEUS	325.0	CERN-NA-028	PI+ NUCLEUS	200.0	CERN-NA-003
MUON NUCLEUS	750.0	FNAL-665	PI+ NUCLEUS	200.0	FNAL-565
PION E-	250.0	CERN-NA-007	PI+ NUCLEUS	200.0	FNAL-629
PION E-	300.0	CERN-NA-007	PI+ NUCLEUS	250.0	CERN-NA-022
PION NUCLEUS	350.0	CERN-NA-019	PI+ NUCLEUS	250.0	FNAL-615
PI+ P	7.7E-02	LAMPF-388	PI+ NUCLEUS	280.0	CERN-NA-003
PI+ P	8.7E-02	LAMPF-388	PI+ NUCLEUS	500.0	FNAL-672
PI+ P	9.6E-02	LAMPF-388	PI+ NUCLEUS	0.	LAMPF-650
PI+ P	0.1	LAMPF-388	PI+	0.	TRI-052
PI+ P	0.1	LAMPF-388	PI+	9.0E-02	SIN-R-80-11
PI+ P	0.1	LAMPF-388	PI+	0.1	SIN-R-82-01
PI+ P	0.1	LAMPF-388	PI+	0.2	SIN-R-71-08
PI+ P	0.1	LAMPF-388	PI+	0.2	SIN-R-81-09
PI+ P	0.2	LAMPF-058-120	PI+	0.2	SIN-R-78-13-1
PI+ P	0.3	0.5	PI+	0.4	SIN-R-71-12
PI+ P	0.4	0.7	PI+	0.5	LAMPF-032
PI+ P	0.7	LAMPF-363	PI+	1.0	CERN-PS-188
PI+ P	1.5	1.9	PI+	2.0	CERN-PS-164
PI+ P	2.5	14.0	PIO	?	SERP-E-140
PI+ P	5.0	20.0	PIO	?	SERP-E-119
PI+ P	16.0	SLAC-BC-067	PIO	0.	LAMPF-726
PI+ P	20.0	CERN-WA-056	PIO	0.	TRI-217
PI+ P	50.0	200.0	PI- P	?	SERP-E-140
PI+ P	85.0	CERN-WA-076	PI- P	0.	TRI-181
PI+ P	100.0	FNAL-577	PI- P	0.	TRI-217
PI+ P	100.0	FNAL-597	PI- P	0.	KEK-064
PI+ P	100.0	CERN-NA-008	PI- P	7.7E-02	LAMPF-388
PI+ P	100.0	350.0	PI- P	8.6E-02	LAMPF-190
PI+ P	147.0	FNAL-570	PI- P	8.7E-02	LAMPF-388
PI+ P	200.0	CERN-WA-070	PI- P	9.6E-02	LAMPF-388
PI+ P	200.0	FNAL-577	PI- P	0.1	LAMPF-388
PI+ P	250.0	CERN-NA-022	PI- P	0.1	LAMPF-388

## BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
PI- P	0.1	LAMPF-388	PI- MG	360.0	FNAL-597
PI- P	0.1	SIN-R-81-01	PI- SI	200.0	CERN-NA-032
PI- P	0.1	LAMPF-388	PI- CU	20.0	SERP-E-148
PI- P	0.2	SIN-R-75-07-2	PI- CU	30.0	SERP-E-148
PI- P	0.2	LAMPF-058-120	PI- CU	40.0	SERP-E-148
PI- P	0.3	CERN-SC-094	PI- CU	225.0	FNAL-326
PI- P	0.3	LAMPF-337	PI- SN	225.0	FNAL-326
PI- P	0.3	LAMPF-337	PI- WT	225.0	FNAL-326
PI- P	0.4	LAMPF-363	PI- AU	100.0	FNAL-597
PI- P	0.7	LAMPF-058-120	PI- AU	360.0	FNAL-597
PI- P	1.1	SERP-E-092	PI- PB	100.0	CERN-NA-029
PI- P	2.0	CERN-PS-157	PI- NUCLEUS	200.0	KEK-082
PI- P	5.0	CERN-PS-153	PI- NUCLEUS	0.8	BNL-692
PI- P	5.0	SERP-E-091	PI- NUCLEUS	1.0	SERP-E-127
PI- P	8.0	BNL-771	PI- NUCLEUS	20.0	SERP-E-148
PI- P	8.0	BNL-755	PI- NUCLEUS	20.0	CERN-WA-035
PI- P	12.0	CERN-WA-056	PI- NUCLEUS	30.0	CERN-WA-072
PI- P	13.0	BNL-726	PI- NUCLEUS	30.0	SERP-E-148
PI- P	13.0	BNL-732	PI- NUCLEUS	40.0	SERP-E-143
PI- P	13.0	SERP-E-116	PI- NUCLEUS	40.0	SERP-E-148
PI- P	20.0	BNL-705	PI- NUCLEUS	40.0	SERP-E-135
PI- P	20.0	CERN-WA-007	PI- NUCLEUS	75.0	FNAL-615
PI- P	20.0	SERP-E-148	PI- NUCLEUS	100.0	CERN-NA-010
PI- P	20.0	SERP-E-105	PI- NUCLEUS	100.0	FNAL-258
PI- P	21.0	BNL-769	PI- NUCLEUS	125.0	FNAL-537
PI- P	22.0	BNL-747	PI- NUCLEUS	150.0	CERN-NA-003
PI- P	25.0	SERP-E-116	PI- NUCLEUS	150.0	FNAL-272
PI- P	25.0	SERP-E-134	PI- NUCLEUS	200.0	CERN-NA-003
PI- P	30.0	SERP-E-148	PI- NUCLEUS	200.0	FNAL-490
PI- P	33.0	SERP-E-142	PI- NUCLEUS	200.0	FNAL-515
PI- P	40.0	CERN-WA-007	PI- NUCLEUS	200.0	FNAL-565
PI- P	40.0	SERP-E-112	PI- NUCLEUS	250.0	FNAL-615
PI- P	40.0	SERP-E-116	PI- NUCLEUS	280.0	CERN-NA-003
PI- P	40.0	SERP-E-147	PI- NUCLEUS	300.0	CERN-NA-017
PI- P	40.0	SERP-E-148	PI- NUCLEUS	300.0	FNAL-272
PI- P	40.0	SERP-E-135	PI- NUCLEUS	300.0	FNAL-595
PI- P	60.0	CERN-WA-007	PI- NUCLEUS	>300.0	CERN-NA-015
PI- P	80.0	CERN-WA-007	PI- NUCLEUS	340.0	CERN-WA-061
PI- P	85.0	CERN-WA-067	PI- NUCLEUS	350.0	CERN-WA-071
PI- P	100.0	FNAL-577	PI- NUCLEUS	350.0	CERN-WA-075
PI- P	100.0	FNAL-597	PI- NUCLEUS	350.0	FNAL-653
PI- P	100.0	CERN-NA-024	PI- NUCLEUS	500.0	FNAL-672
PI- P	100.0	FNAL-258	PI- ?	?	SERP-E-115
PI- P	140.0	CERN-WA-011	PI- ?	?	SIN-R-78-15-1
PI- P	147.0	FNAL-570	PI- ?	4.0E-02	SIN-R-82-03-1
PI- P	150.0	CERN-NA-005	PI- ?	1.0	CERN-PS-188
PI- P	150.0	CERN-NA-008	PI- ?	2.0	CERN-PS-164
PI- P	175.0	FNAL-663	ETA	?	SERP-E-134
PI- P	200.0	CERN-WA-070	RHO0	?	SERP-E-148
PI- P	200.0	FNAL-577	OMEGA	?	SERP-E-140
PI- P	200.0	FNAL-580	OMEGA	?	SERP-E-134
PI- P	300.0	CERN-NA-005	ETA PRIME	?	SERP-E-134
PI- P	300.0	CERN-NA-012	PHI	?	SERP-E-140
PI- P	300.0	CERN-WA-070	A1(1270)-	?	SERP-E-148
PI- P	300.0	FNAL-623	D(1285)	?	SERP-E-142
PI- P	360.0	CERN-NA-013	FPRIME	?	SERP-E-142
PI- P	360.0	CERN-NA-016	A3(1680)-	?	SERP-E-148
PI- P	360.0	CERN-NA-027	UPS(9460)	?	DESY-CRYSTAL-BAL
PI- P	360.0	FNAL-597	UPS(10020)	?	DESY-CRYSTAL-BAL
PI- P	450.0	CERN-WA-070	K+ P	11.0	SLAC-E-135
PI- DEUT	7.7E-02	LAMPF-388	K+ P	12.0	CERN-WA-055
PI- DEUT	8.7E-02	LAMPF-388	K+ P	32.1	SERP-E-133
PI- DEUT	9.5E-02	LAMPF-295	K+ P	70.0	CERN-WA-027
PI- DEUT	9.6E-02	LAMPF-388	K+ P	100.0	FNAL-577
PI- DEUT	0.1	LAMPF-388	K+ P	100.0	FNAL-597
PI- DEUT	0.1	LAMPF-388	K+ P	147.0	FNAL-570
PI- DEUT	0.1	LAMPF-388	K+ P	200.0	FNAL-577
PI- DEUT	0.1	LAMPF-388	K+ P	250.0	CERN-NA-022
PI- DEUT	0.1	SIN-R-81-01	K+ N	1.1	KEK-034
PI- DEUT	0.1	LAMPF-388	K+ N	1.3	KEK-034
PI- DEUT	0.2	LAMPF-478	K+ N	1.4	KEK-034
PI- DEUT	0.3	LAMPF-689	K+ N	1.5	KEK-034
PI- DEUT	0.3	LAMPF-581	K+ N	5.0	SERP-E-091
PI- DEUT	0.4	LAMPF-581	K+ N	5.0	SERP-E-102
PI- DEUT	0.4	LAMPF-358	K+ N	75.0	FNAL-585
PI- DEUT	0.4	KEK-083	K+ N	100.0	FNAL-585
PI- DEUT	0.4	LAMPF-358	K+ N	150.0	FNAL-585
PI- DEUT	0.5	LAMPF-358	K+ N	150.0	FNAL-585
PI- DEUT	1.0	CERN-PS-159	K+ DEUT	1.5	KEK-081
PI- DEUT	5.0	SERP-E-091	K+ DEUT	1.7	KEK-081
PI- DEUT	300.0	FNAL-705	K+ DEUT	5.0	SERP-E-091
PI- HE3	0.	SIN-R-79-05	K+ MG	100.0	FNAL-597
PI- HE3	0.2	LAMPF-546	K+ AU	100.0	FNAL-597
PI- HE3	0.3	LAMPF-546	K+ NUCLEUS	0.8	BNL-692
PI- TRIT	0.2	LAMPF-546	K+ NUCLEUS	20.0	CERN-WA-035
PI- TRIT	0.3	LAMPF-546	K+ NUCLEUS	70.0	CERN-WA-061
PI- BE	100.0	CERN-NA-011	K+ NUCLEUS	200.0	FNAL-565
PI- BE	200.0	FNAL-567	K+ NUCLEUS	250.0	CERN-NA-022
PI- BE	225.0	FNAL-610	K+ NUCLEUS	500.0	FNAL-672
PI- BE	225.0	FNAL-326	K+	0.	KEK-099
PI- BE	275.0	FNAL-650	K+	<0.5	KEK-089
PI- BE	350.0	CERN-WA-077	K+	0.5	KEK-010
PI- C	530.0	FNAL-706	K+	2.0	CERN-PS-164
PI- NE	30.0	CERN-WA-051	K+	4.0	BNL-735
PI- NE	64.0	CERN-WA-051	K+	6.0	BNL-777
PI- MG	100.0	FNAL-597	KO	?	BNL-749

## BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)		EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)		EXPERIMENT
KS	50.0	200.0	FNAL-621	P P	1.1		TRI-192
KS	450.0		CERN-NA-031	P P	1.1	1.5	LAMPF-518
KL	0.	3.0	BNL-696	P P	1.1		LAMPF-492
KL	30.0	200.0	FNAL-617	P P	1.1		TRI-174
KL	50.0	150.0	FNAL-533	P P	1.1		TRI-192
KL	50.0	200.0	FNAL-621	P P	1.2		SIN-R-78-05-4
KL	450.0		CERN-NA-031	P P	1.2		LAMPF-590
K- P	0.		CERN-PS-165	P P	1.2		LAMPF-517
K- P	0.7		BNL-702	P P	1.3		LAMPF-194
K- P	0.7		BNL-759	P P	1.3		LAMPF-336
K- P	2.2		BNL-698	P P	1.3		LAMPF-517
K- P	3.0		BNL-593	P P	1.3		LAMPF-585
K- P	4.0		BNL-673	P P	1.3		LAMPF-708
K- P	4.6		BNL-593	P P	1.3	1.5	LAMPF-636
K- P	4.7		CERN-PS-157	P P	1.3		LAMPF-517
K- P	5.0		BNL-673	P P	1.4		LAMPF-517
K- P	5.0	20.0	SERP-E-091	P P	1.5		LAMPF-385
K- P	6.0		BNL-771	P P	1.5		LAMPF-492
K- P	8.0	16.0	CERN-WA-074	P P	1.5		LAMPF-015
K- P	11.0		SLAC-E-135	P P	1.5		LAMPF-194
K- P	12.0		CERN-WA-049	P P	1.5		LAMPF-336
K- P	13.0		SERP-E-116	P P	1.5		LAMPF-392
K- P	18.5		CERN-WA-060	P P	1.5		LAMPF-402
K- P	20.0		CERN-WA-007	P P	1.5		LAMPF-457
K- P	20.0		SERP-E-148	P P	1.5		LAMPF-462
K- P	22.0		BNL-747	P P	1.5		LAMPF-590
K- P	25.0		SERP-E-116	P P	1.5		LAMPF-517
K- P	30.0		SERP-E-148	P P	1.5		LAMPF-563
K- P	33.0		SERP-E-142	P P	1.5		LAMPF-637
K- P	40.0		CERN-WA-007	P P	1.5		LAMPF-708
K- P	40.0		SERP-E-112	P P	1.5		LAMPF-758
K- P	40.0		SERP-E-116	P P	5.6		BNL-722
K- P	40.0		SERP-E-148	P P	12.0		CERN-WA-055
K- P	40.0	55.0	SERP-E-135	P P	15.0		BNL-748
K- P	60.0		CERN-WA-007	P P	20.0		BNL-717
K- P	75.0		FNAL-585	P P	20.0		BNL-748
K- P	80.0		CERN-WA-007	P P	20.0		CERN-WA-007
K- P	100.0		FNAL-577	P P	23.0		BNL-748
K- P	100.0		FNAL-585	P P	24.0		BNL-717
K- P	108.6		CERN-WA-028	P P	26.0		BNL-748
K- P	150.0		FNAL-585	P P	28.5		BNL-748
K- P	175.0		FNAL-663	P P	32.0		SERP-E-150
K- P	200.0		FNAL-577	P P	40.0		CERN-WA-007
K- DEUT	1.0	1.4	CERN-PS-159	P P	50.0	200.0	CERN-WA-006
K- DEUT	5.0	20.0	SERP-E-091	P P	60.0		CERN-WA-007
K- HE	0.7		BNL-774	P P	70.0		SERP-E-100
K- LI6	0.7		BNL-752	P P	80.0		CERN-WA-007
K- C	0.8		BNL-759	P P	85.0		CERN-WA-076
K- O	0.7		BNL-752	P P	100.0		FNAL-577
K- IR	6.0		BNL-751	P P	100.0		FNAL-597
K- NUCLEUS	0.5		CERN-PS-166	P P	100.0	300.0	CERN-NA-008
K- NUCLEUS	0.6		BNL-646	P P	100.0	350.0	CERN-NA-024
K- NUCLEUS	0.8		BNL-646	P P	147.0		FNAL-570
K- NUCLEUS	0.8		BNL-692	P P	175.0		FNAL-663
K- NUCLEUS	0.8		BNL-746	P P	200.0		CERN-NA-005
K- NUCLEUS	0.8		BNL-760	P P	200.0		CERN-NA-025
K- NUCLEUS	1.0		SERP-E-127	P P	200.0		CERN-WA-070
K- NUCLEUS	20.0	150.0	CERN-WA-035	P P	200.0		FNAL-577
K- NUCLEUS	40.0	55.0	SERP-E-135	P P	200.0		FNAL-704
K- NUCLEUS	70.0		CERN-WA-061	P P	212.2		CERN-R-420
K- NUCLEUS	150.0		FNAL-272	P P	250.0		CERN-NA-022
K- NUCLEUS	200.0		FNAL-565	P P	257.0	2047.5	CERN-R-209
K- NUCLEUS	300.0		FNAL-272	P P	257.0	2047.5	CERN-R-415
K- NUCLEUS	500.0		FNAL-672	P P	257.0	2047.5	CERN-R-416
K-	?		SERP-E-115	P P	268.8		CERN-UA-06
K-	2.0	20.0	CERN-PS-164	P P	281.0	2047.5	CERN-R-211
KAON E-	250.0		CERN-NA-007	P P	293.3		CERN-R-108
KAON E-	300.0		CERN-NA-007	P P	293.3	2094.0	CERN-R-210
MESON (UNSPEC)-	?		SERP-E-148	P P	300.0		CERN-NA-005
PROTON-PROTON COLLIDING BEAM EXPERIMENTS AT THE CERN-ISR ARE				P P	300.0		CERN-WA-070
ORDERED BY THE EQUIVALENT LAB MOMENTUM FOR SCATTERING ON A				P P	360.0		CERN-NA-016
STATIONARY TARGET RATHER THAN BY THE ACTUAL LAB (=CENTER-OF-MASS)				P P	360.0		CERN-NA-025
MOMENTUM.				P P	360.0		CERN-NA-027
P P	0.3		SIN-Z-75-02	P P	>360.0		CERN-NA-023
P P	0.6	1.1	TRI-074	P P	400.0		FNAL-557
P P	0.7		TRI-171	P P	400.0		FNAL-609
P P	0.8	1.2	SIN-R-71-07	P P	450.0		CERN-WA-070
P P	0.8	1.2	SIN-R-80-01	P P	478.7		CERN-R-421
P P	0.8	1.5	LAMPF-498	P P	478.7		CERN-R-608
P P	0.8	1.5	LAMPF-504	P P	478.7	2047.5	CERN-R-110
P P	0.9	2.0	KEK-057	P P	478.7	2047.5	CERN-R-501
P P	0.9		TRI-174	P P	478.7	2047.5	CERN-R-808
P P	1.0		TRI-192	P P	478.7	2114.1	CERN-R-806
P P	1.0	1.5	LAMPF-508	P P	498.0		CERN-R-108
P P	1.0		TRI-174	P P	511.2	2047.5	CERN-R-807
P P	1.0		TRI-192	P P	800.0		FNAL-557
P P	1.0	1.2	SIN-R-78-06	P P	1030.7		CERN-R-421
P P	1.0	1.2	SIN-R-82-06	P P	1063.8		CERN-R-607
P P	1.0		TRI-192	P P	1068.6		CERN-R-108
P P	1.1		TRI-174	P P	1440.0		CERN-R-420
P P	1.1		TRI-192	P P	1479.1		CERN-R-108
P P	1.1		LAMPF-336	P P	1495.9		CERN-R-608
P P	1.1		LAMPF-392	P P	2047.5		CERN-R-419
P P	1.1		LAMPF-517	P P	2047.5		CERN-R-421
P P	1.1		LAMPF-563	P P	2047.5		CERN-R-422

## BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
P P	2047.5	CERN-R-608	P NUCLEUS	450.0	CERN-WA-068
P P	2067.4	CERN-R-607	P NUCLEUS	500.0	FNAL-576
P P	2074.0	CERN-R-108	P NUCLEUS	500.0	FNAL-672
P P	2114.1	CERN-R-420	P NUCLEUS	750.0	FNAL-508
P P	1.6E+05	CERN-R-703	P NUCLEUS	800.0	FNAL-557
P N		SERP-E-119	P NUCLEUS	1000.0	FNAL-672
P N	0.8	LAMPF-504	P WATER	30.0	BNL-739
P N	1.1	LAMPF-392	P	1.0	10.0
P N	1.2	LAMPF-590	P	2.0	20.0
P N	1.3	KEK-075	N P	0.	400.0
P N	1.4	KEK-075	N P	0.6	1.2
P N	1.5	LAMPF-385	N P	0.6	0.8
P N	1.5	LAMPF-392	N P	1.0	
P N	1.5	LAMPF-457	N P	1.1	LAMPF-498
P N	1.5	LAMPF-590	N P	1.1	LAMPF-665
P N	1.6	KEK-075	N P	1.1	LAMPF-683
P N	1.8	KEK-075	N P	1.1	TRI-121
P N	32.0	SERP-E-150	N P	1.1	LAMPF-492
P NUCLEON	1.5	LAMPF-634	N P	1.2	LAMPF-590
P DEUT	1.0	LAMPF-498	N P	1.2	LAMPF-066
P DEUT	1.1	LAMPF-635	N P	1.3	LAMPF-498
P DEUT	1.1	LAMPF-664	N P	1.3	LAMPF-665
P DEUT	1.3	LAMPF-585	N P	1.3	LAMPF-683
P DEUT	1.3	LAMPF-635	N P	1.5	LAMPF-366
P DEUT	1.3	LAMPF-664	N P	1.5	LAMPF-403
P DEUT	1.5	LAMPF-385	N P	1.5	LAMPF-492
P DEUT	1.5	LAMPF-015	N P	1.5	LAMPF-590
P DEUT	1.5	LAMPF-360	N P	1.5	LAMPF-498
P DEUT	1.5	LAMPF-462	N P	1.5	LAMPF-589
P DEUT	1.5	LAMPF-635	N P	1.5	LAMPF-665
P DEUT	1.5	LAMPF-664	N P	1.5	LAMPF-683
P DEUT	20.0	BNL-717	N P	10.0	BNL-766
P DEUT	24.0	BNL-717	N DEUT	0.6	1.2
P DEUT	32.0	SERP-E-150	N C	45.0	SIN-R-72-02
P DEUT	70.0	SERP-E-100	N SI	280.0	SERP-E-104
P DEUT	300.0	FNAL-705	N NUCLEUS	40.0	FNAL-400
P HE	0.3	SIN-Z-80-01	N NUCLEUS	300.0	SERP-E-146
P HE	1.5	LAMPF-015	N	1.4E-04	FNAL-630
P HE	72.1	CERN-R-210	AN P	0.1	LAMPF-647
P HE	118.7	CERN-R-110	AN NUCLEUS	0.	0.5
P HE	480.8	CERN-R-418	AP P	0.	1.0
P HE	1036.5	CERN-R-418	AP P	0.	
P BE	1.5	LAMPF-360	AP P	0.	CERN-PS-170
P BE	28.0	BNL-744	AP P	0.	CERN-PS-171
P BE	100.0	CERN-NA-011	AP P	0.	CERN-PS-174
P BE	270.0	FNAL-673	AP P	0.	CERN-PS-182
P BE	400.0	CERN-NA-020	AP P	0.	CERN-PS-183
P BE	400.0	FNAL-555	AP P	0.	CERN-PS-183
P C	400.0	FNAL-706	AP P	0.	CERN-PS-161
P C	530.0	FNAL-706	AP P	0.	0.3
P C	800.0	FNAL-706	AP P	0.	0.5
P C12	1.5	LAMPF-651	AP P	0.2	0.6
P MG	100.0	FNAL-597	AP P	0.2	0.8
P AR	200.0	CERN-NA-005	AP P	0.3	2.0
P CR	500.0	FNAL-524	AP P	0.3	2.0
P CU	400.0	CERN-NA-020	AP P	0.3	0.6
P CU	400.0	CERN-WA-054	AP P	0.4	0.7
P AG	500.0	FNAL-524	AP P	0.4	0.6
P XE	200.0	CERN-NA-005	AP P	0.4	0.9
P WT	500.0	FNAL-524	AP P	0.4	0.9
P AU	100.0	FNAL-597	AP P	0.4	1.0
P AU	400.0	CERN-NA-030	AP P	0.5	1.0
P U	20.0	CERN-PS-162	AP P	0.5	1.0
P NUCLEUS	?	KEK-084	AP P	0.7	0.8
P NUCLEUS		KEK-082	AP P	0.8	1.3
P NUCLEUS	1.0	SERP-E-127	AP P	0.9	1.3
P NUCLEUS	1.0	BNL-778	AP P	1.5	2.0
P NUCLEUS	1.2	SIN-R-78-02	AP P	3.0	
P NUCLEUS	4.0	KEK-045	AP P	3.5	3.0
P NUCLEUS	13.0	KEK-066	AP P	3.5	7.5
P NUCLEUS	20.0	CERN-WA-035	AP P	4.0	
P NUCLEUS	20.0	FNAL-591	AP P	4.5	
P NUCLEUS	70.0	SERP-E-120	AP P	6.1	4.5
P NUCLEUS	70.0	SERP-E-121	AP P	7.0	6.1
P NUCLEUS	70.0	SERP-E-144	AP P	7.0	7.0
P NUCLEUS	200.0	FNAL-565	AP P	8.0	16.0
P NUCLEUS	200.0	FNAL-629	AP P	8.9	
P NUCLEUS	200.0	FNAL-466	AP P	12.0	
P NUCLEUS	240.0	CERN-WA-046	AP P	13.0	
P NUCLEUS	250.0	CERN-NA-022	AP P	20.0	
P NUCLEUS	300.0	FNAL-595	AP P	20.0	
P NUCLEUS	400.0	CERN-WA-038	AP P	25.0	
P NUCLEUS	400.0	CERN-WA-052	AP P	30.0	
P NUCLEUS	400.0	CERN-WA-065	AP P	32.0	
P NUCLEUS	400.0	CERN-WA-066	AP P	32.0	
P NUCLEUS	400.0	FNAL-497	AP P	40.0	
P NUCLEUS	400.0	FNAL-549	AP P	40.0	
P NUCLEUS	400.0	FNAL-557	AP P	40.0	
P NUCLEUS	400.0	FNAL-565	AP P	60.0	
P NUCLEUS	400.0	FNAL-605	AP P	74.0	
P NUCLEUS	400.0	FNAL-608	AP P	80.0	
P NUCLEUS	400.0	FNAL-613	AP P	100.0	
P NUCLEUS	400.0	FNAL-631	AP P	100.0	
P NUCLEUS	400.0	FNAL-622	AP P	137.0	
P NUCLEUS	450.0	CERN-WA-031	AP P	147.0	
			AP P	175.0	FNAL-570
					FNAL-663

## BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
AP P	200.0	CERN-NA-005	AP	2.0	CERN-PS-164
AP P	200.0	FNAL-577	LAMBDA P	30.0	SERP-E-120
AP P	200.0	FNAL-704	LAMBDA DEUT	30.0	SERP-E-120
AP P	212.2	CERN-R-420	LAMBDA NUCLEUS	80.0	FNAL-619
AP P	268.8	CERN-UA-06	LAMBDA	?	KEK-049
AP P	293.3	CERN-R-210	LAMBDA	60.0	FNAL-361
AP P	450.0	CERN-WA-070	SIGMA+ P	30.0	SERP-E-120
AP P	478.7	CERN-R-421	SIGMA+ DEUT	30.0	SERP-E-120
AP P	478.7	CERN-R-608	SIGMA+	?	KEK-092
AP P	478.7	CERN-R-110	SIGMA+	120.0	FNAL-620
AP P	478.7	CERN-R-211	SIGMA- P	30.0	SERP-E-120
AP P	478.7	CERN-R-501	SIGMA- P	74.0	CERN-WA-042
AP P	478.7	CERN-R-808	SIGMA- P	137.0	CERN-WA-042
AP P	511.2	CERN-R-807	SIGMA- DEUT	30.0	SERP-E-120
AP P	1030.7	CERN-R-421	SIGMA- DEUT	74.0	CERN-WA-042
AP P	1440.0	CERN-R-420	SIGMA- DEUT	137.0	CERN-WA-042
AP P	1495.9	CERN-R-608	SIGMA- BE	135.0	CERN-WA-062
AP P	2047.5	CERN-R-421	SIGMA- NUCLEUS	0.	BNL-723
AP P	2047.5	CERN-R-608	SIGMA- NUCLEUS	1.0	SERP-E-127
AP P	2114.1	CERN-R-420	SIGMA- NUCLEUS	20.0	FNAL-666
AP P	5328.0	CERN-UA-04	SIGMA-	100.0	CERN-WA-046
AP P	47959.2	FNAL-710	SIGMA-	120.0	FNAL-620
AP P	47959.2	FNAL-713	SIGMA-	250.0	FNAL-715
AP P	1.3E+05	FNAL--CDF	XIO P	30.0	SERP-E-120
AP P	1.6E+05	CERN-R-703	XIO DEUT	30.0	SERP-E-120
AP P	1.6E+05	CERN-UA-01	XI- P	30.0	SERP-E-120
AP P	1.6E+05	CERN-UA-02	XI- P	74.0	CERN-WA-042
AP P	1.6E+05	CERN-UA-03	XI- P	137.0	CERN-WA-042
AP P	1.6E+05	CERN-UA-05	XI- DEUT	30.0	SERP-E-120
AP N	9.0	SLAC-BC-070	XI- DEUT	74.0	CERN-WA-042
AP N	32.0	SERP-E-150	XI- DEUT	137.0	CERN-WA-042
AP DEUT	0.	CERN-PS-174	XI-	120.0	FNAL-620
AP DEUT	0.	CERN-PS-175	OMEGA- P	30.0	SERP-E-120
AP DEUT	0.	CERN-PS-161	OMEGA- DEUT	30.0	SERP-E-120
AP DEUT	0.	BNL-772	OMEGA-	100.0	CERN-WA-046
AP DEUT	0.	CERN-PS-179	OMEGA-	120.0	FNAL-620
AP DEUT	0.5	BNL-701	OMEGA-	130.0	CERN-WA-046
AP DEUT	0.7	BNL-701	DEUT P	1.5	LAMPF-685
AP DEUT	0.8	CERN-PS-163-1	DEUT P	2.0	KEK-080
AP DEUT	0.9	BNL-701	DEUT HE3	0.2	SIN-R-73-01-2
AP DEUT	6.1	SLAC-BC-068	DEUT	5.0	CERN-WA-033
AP DEUT	8.9	SLAC-BC-068	ADEUT P	12.0	SERP-E-139
AP DEUT	32.0	SERP-E-150	ADEUT DEUT	12.0	SERP-E-139
AP DEUT	74.0	CERN-WA-042	ADEUT	5.0	CERN-WA-033
AP DEUT	137.0	CERN-WA-042	HE3	5.0	CERN-WA-033
AP DEUT	300.0	FNAL-705	AHE3	5.0	CERN-WA-033
AP HE3	0.	CERN-PS-179	TRIT	5.0	CERN-WA-033
AP HE	0.	CERN-PS-179	ATRIT	5.0	CERN-WA-033
AP NE	0.	CERN-PS-179	HE HE	70.2	CERN-R-210
AP MG	100.0	FNAL-597	HE HE	116.9	CERN-R-110
AP AR	0.	CERN-PS-179	HE HE	116.9	CERN-R-808
AP AR	200.0	CERN-NA-005	HE HE	125.1	CERN-R-807
AP XE	200.0	CERN-NA-005	HE HE	2091.7	CERN-R-418
AP AU	100.0	FNAL-597	HE	5.0	CERN-WA-033
AP NUCLEUS	?	KEK-084	AHE	5.0	CERN-WA-033
AP NUCLEUS	0.	CERN-PS-176	BOR12	6.5E-02	SIN-R-77-01
AP NUCLEUS	0.	CERN-PS-177	LONGLIVED	5.0	CERN-WA-033
AP NUCLEUS	0.	CERN-PS-186	HADRON P	200.0	FNAL-690
AP NUCLEUS	0.	CERN-PS-161	HADRON P	360.0	CERN-NA-026
AP NUCLEUS	0.	CERN-PS-187	HADRON NUCLEUS	?	CERN-WA-018
AP NUCLEUS	0.	CERN-PS-184	CHARGED+ P	40.0	CERN-WA-063
AP NUCLEUS	0.3	CERN-WA-035	CHARGED+	10.0	SERP-E-132
AP NUCLEUS	20.0	CERN-WA-061	CHARGED+	50.0	FNAL-660
AP NUCLEUS	70.0	FNAL-537	CHARGED- P	40.0	CERN-WA-063
AP NUCLEUS	125.0	FNAL-272	CHARGED-	10.0	SERP-E-132
AP NUCLEUS	150.0	FNAL-272	CHARGED-	50.0	FNAL-660
AP NUCLEUS	300.0	FNAL-672	NEUTRAL	?	FNAL-584
AP NUCLEUS	500.0				

## SPOKESPERSON INDEX

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ADAIR, R.K.	YALE	BNL-735	DEUTSCH, M.	MIT	BNL-760
ADAIR, R.K.	YALE	BNL-749	DEVLIN, T.	RUTG	FNAL-619
ALBROW, M.G.	RHEL	CERN-R-807	DEVLIN, T.	RUTG	FNAL-555
ANDERSON, H.L.	LANL	LAMPF-455	DEVRIES, R.	LANL	CERN-PS-187
ANTIPOV, Y.M.	SERP	SERP-E-143	DIAMBRINI-PALAZZI, G.	GENO	CERN-WA-058
ANTIPOV, Y.M.	SERP	SERP-E-148	DIAMBRINI-PALAZZI, G.	ROMA	CERN-WA-071
ARNOLD, R.G.	AMER	SLAC-E-136	DICK, L.	CERN	CERN-UA-06
ASTBURY, A.	RHEL	CERN-UA-01	DITZLER, W.R.	ANL	LAMPF-683
ASTON, D.	SLAC	SLAC-E-135	DOMBECK, T.W.	UMD	LAMPF-638
AUER, I.P.	ANL	LAMPF-498	DONALD, R.A.	LIVP	CERN-WA-049
AVILEZ, C.	MEXU	BNL-766	DORFAN, J.	SLAC	SLAC-PEP-005
AXEN, D.A.	BRCO	TRI-174	DUBOC, J.	CURI	CERN-NA-021
BACKENSTOSS, G.	BASL	SIN-R-79-05	DUONG-VAN, M.	LANL	LAMPF-400-445
BADAWY, O.E.	NADI	CERN-WA-061	DZIERBA, A.	IND	FNAL-672
BAILLON, P.	CERN	CERN-PS-153	ECKHAUSE, M.	WILL	TRI-137
BAKER, S.I.	FNAL	FNAL-631	ELLIS, R.J.	LANL	LAMPF-647
BALDO-CEOLIN, M.	PADO	CERN-PS-180	ENDO, I.	HIRO	INS-15-3
BALTAY, C.	COLU	FNAL-646	ERMOLOV, P.F.	SERP	FNAL-180
BALTAY, C.	COLU	FNAL-380	EXTERMANN, P.	GEVA	CERN-WA-042
BALTAY, C.	COLU	FNAL-053A	FAESSLER, M.A.	CERN	CERN-WA-035
BARKOV, L.M.	NOVO	SERP-E-092	FAESSLER, M.A.	MPIH	CERN-R-418
BARLOUTAUD, R.	SACL	P-DECAY-FREJUS	FAVART, D.	LVLN	CERN-R-211
BARLOUTAUD, R.	SACL	CERN-PS-168	FELDMAN, G.	SLAC	SLAC-SP-029
BARNES, P.D.	CMU	BNL-759	FELST, R.	DESY	DESY-PETRA-JADE
BARNETT, B.	JHU	BNL-776	FERBEL, T.	ROCH	FNAL-272
BARRELET, E.	EPOL	CERN-PS-157	FERRER, A.	CERN	CERN-WA-056
BARTLETT, D.F.	COLO	FNAL-502	FETSCHER, W.	ETHZ	SIN-R-74-05
BATTY, C.J.	RHEL	CERN-PS-165	FIDECARO, G.	CERN	CERN-WA-006
BEER, G.A.	VICT	TRI-181	FIORINI, E.	MILA	P-DECAY-NUSEX
BELLINI, G.	MILA	CERN-NA-029	FIORINI, E.	MILA	CERN-PS-167
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SHEPARD, P.	PITT	FNAL-553	WEBSTER, M.S.	VAND	BNL-705
SHEPARD, W.D.	NDAM	FNAL-597	WEDDIGEN, C.	KFZK, KARL	SIN-R-78-05-4
SHIN, Y.M.	SASK	TRI-205	WEINSTEIN, R.	HOUS	SLAC-PEP-006
SHLYAPNIKOV, P.V.	SERP	SERP-E-133	WELSH, R.E.	WILL	LAMPF-085
SHOCHET, M.J.	CHIC	FNAL-326	WELSH, R.E.	WILL	BNL-723
SHOCHET, M.J.	EPI	FNAL-258	WHARTON, W.R.	CMU	BNL-692
SHUVALOV, R.S.	SERP	SERP-E-130	WHITE, D.H.	BNL	BNL-734
SIMMONS, J.E.	LANL	LAMPF-066	WHITMORE, J.	MSU	FNAL-597
SIMMONS, J.E.	LANL	LAMPF-457	WILKES, R.J.	WASH	FNAL-666
SIMMONS, J.E.	LANL	LAMPF-590	WILKES, R.J.	WASH	FNAL-524
SIMMONS, J.E.	LANL	LAMPF-517	WILLARD, H.B.	CASE	LAMPF-492
SIMMONS, J.E.	LANL	LAMPF-360	WILLIAMS, H.H.	PENN	BNL-706
SIMMONS, J.E.	LANL	LAMPF-402	WILLIS, W.	CERN	CERN-R-806
SIMMONS, J.E.	LANL	LAMPF-518	WILLIS, W.J.	CERN	CERN-R-808
SIMMONS, J.E.	LANL	LAMPF-683	WINSTEIN, B.	CHIC	FNAL-584
SIMONIUS, M.	ETHZ	SIN-Z-75-02	WINSTEIN, B.	EPI	FNAL-617
SIMONIUS, M.	ETHZ	SIN-Z-80-01	WINTER, K.	CERN	CERN-WA-065
SIMONS, L.M.	KFZK, KARL	CERN-PS-175	WINTER, K.	CERN	CERN-WA-018
SIMONS, L.M.	KFZK, KARL	SIN-R-81-02	WINTER, K.	CERN	CERN-PS-181
SLATTERY, P.	ROCH	FNAL-706	WITHERELL, M.S.	PRIN	FNAL-567
SMIRNOV, V.M.	LENI	SERP-E-127	WOLF, G.	DESY	DESY-PETRA-TASSO
SMITH, G.	KARL	SIN-R-78-18	WOLTER, W.	CRAC	FNAL-508
SMITH, G.	KARL	SIN-R-79-07	WOTSCHACK, J.	CERN	CERN-PS-169
SMITH, G.A.	MSU	CERN-PS-183	YAMAMOTO, S.S.	TOKY	KEK-057
SMITH, G.A.	MSU	BNL-767	YAMAZAKI, T.	TOKY	KEK-089
SMITH, G.A.	MSU	BNL-762	YOKOSAWA, A.	ANL	FNAL-704
SMOLYANKIN, V.T.	ITEP	SERP-E-120	YOSHIMURA, Y.	KEK	KEK-062
SNOW, G.A.	UMD	FNAL-545	YUAN, V.	ILL	LAMPF-634
SOBER, D.I.	CATH	LAMPF-058-120	ZEHNDER, A.	ETHZ	SIN-R-77-01
SOKOLOVSKY, V.V.	ITEP	SERP-E-147	ZELLER, M.E.	YALE	BNL-702
SOUDER, P.A.	YALE	LAMPF-421	ZELLER, M.E.	YALE	BNL-777
STANEK, R.	ANL	LAMPF-664	ZICHICHI, A.	CERN	CERN-R-422
STEINBERGER, J.	CERN	CERN-WA-001	ZICHICHI, A.	CERN	CERN-WA-044
STEINBERGER, J.	CERN	CERN-WA-068	ZICHICHI, A.	CERN	CERN-R-421
STEINBERGER, J.	CERN	CERN-WA-054	ZIOCK, K.O.H.	CERN	SIN-R-80-11
STREIT, K.P.	HEID	CERN-WA-062	ZIOCK, K.O.H.	VIRG	LAMPF-190
STROVINK, M.	UCB, LBL	TRI-185	ZOLIN, L.S.	VIRG	SERP-E-121
STRUB, R.	STRB	CERN-WA-046	ZUPANCIC, C.	JINR	CERN-NA-004
SUGARMAN, N.	CHIC	FNAL-466		MPIM	



## ABBREVIATIONS USED ON THE MICROFICHE

### JOURNALS

Following are abbreviations for journals listed in the summaries:

AJP	American Journal of Physics
ANNP	Annals of Physics
BAPS	Bulletin of the American Physical Society
HPA	Helvetica Physica Acta
IEEE TNS	Institute of Electrical and Electronics Engineers Transactions in Nuclear Science
JASA	Journal of the Acoustical Society of America
JETPL	JETP Letters (translation of ZETFP)
JPSJ	Journal of the Physical Society of Japan
LNC	Lettere al Nuovo Cimento
NIM	Nuclear Instruments and Methods
NP	Nuclear Physics
PL	Physics Letters
PR	Physical Review
PREP	Physics Reports (Physics Letters C)
PRL	Physical Review Letters
PS	Physica Scripta
SJNP	Soviet Journal of Nuclear Physics (translation of YF)
YF	Yadernaya Fizika (translated as SJNP)
ZETFP	Pis'ma v Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki (translated as JETPL)
ZPHY	Zeitschrift für Physik

### KINEMATIC VARIABLES

The following abbreviations are used with reactions to indicate the momenta or energies at which they are studied:

PLAB	beam momentum in the lab frame
TLAB	beam kinetic energy in the lab frame
ECM	total energy in the c.m. frame
Q2	absolute value of the 4-momentum transfer

### ACCELERATORS

BNL	Brookhaven (AGS) Proton Synchrotron (31 GeV/c Plab)
CERN	CERN (PS) Proton Synchrotron (28 GeV/c Plab)
CERN-ISR	CERN Proton-Proton ISR (62 GeV Ecm)
CERN-PBAR/P	CERN Proton-Antiproton Collider (540 GeV Ecm)
CERN-SC	CERN Synchro-Cyclotron (600 MeV Tlab)
CERN-SPS	CERN Super Proton Synchrotron (450 GeV/c Plab)
CESR	Cornell Positron-Electron Storage Ring (16 GeV Ecm)
DESY	Deutsches Electron Synchrotron (7.5 GeV/c Plab)
DESY-DORIS	DESY Positron-Electron Ring (11.6 GeV Ecm)
DESY-PETRA	DESY Positron-Electron Colliding Beams (40 GeV Ecm)
FNAL	FNAL Proton Synchrotron (500 GeV/c Plab)
FNAL-TEV	FNAL Tevatron (2000 GeV Ecm)
KEK	KEK Proton Synchrotron (13 GeV/c Plab)
KEK-TRISTAN	KEK Positron-Electron Ring (60 GeV Ecm)
LAMPF	Los Alamos Meson/Proton Factory (1460 MeV/c Plab)
SERP	IHEP Serpukhov Proton Synchrotron (76 GeV/c Plab)
SIN	Schweizerisches Inst. für Nuklearforschung (590 MeV Tlab)
SLAC	Stanford Electron Linear Accelerator (33 GeV/c Plab)
SLAC-PEP	SLAC Positron-Electron Project (36 GeV Ecm)
SLAC-SPEAR	SLAC Positron-Electron Ring (8.4 GeV Ecm)
TOKY	INS Tokyo Electron Synchrotron (1.3 GeV/c Plab)
TRIUMF	Canadian Triangle Universities Meson Facility (520 MeV Tlab)

## DETECTORS

For bubble chambers we use a construction such as:

DBC-2M

or

HBC-15FT-HYB

or

HLBC-BEBC-TST.

The first element, one of

HBC

DBC

HEBC

HLBC,

tells whether the chamber fill is hydrogen, deuterium, helium, or heavy liquid. The second element gives the size or name of the chamber. Where appropriate, a third element, one of

HYB

RAP

TST,

indicates that the chamber is part of a hybrid system, or that it is rapid cycling, or that it contains a track-sensitive target.

For non-bubble-chamber detectors, general abbreviations are:

CALO	calorimeter
CNTR	counters (no chambers)
COMB	combinations of different types of detectors, no particular one dominant
DAS	double arm spectrometer
EMUL	emulsion
OSPK	optical spark chambers
OTHER	rare non-electronic detectors (e.g., moon, ocean floor)
PHOTON	photon spectrometer
PLASTIC	lexan or other such material in which tracks are frozen (except emulsion)
SAS	single arm spectrometer
SPEC	general spectrometer
STRC	streamer chamber
WIRE	wire chambers (proportional wire chambers, drift chambers, etc.; includes all non-optical spark chambers by convention)
WAS	wide angle spectrometer

## DETECTORS (CONT'D)

Acronyms for specific detectors:

AFS	CERN-ISR axial field spectrometer
ARGUS	DESY-DORIS detector system
CCS	FNAL Chicago cyclotron spectrometer
CDF	FNAL-TEV Collider detector
CDHS	CERN-Dortmund-Heidelberg-Saclay neutrino detector (WA1)
CELLO	DESY-PETRA spectrometer system
CHARM	CERN-Hamburg-Amsterdam-Rome-Moscow-neutrino detector
CLEO	CESR spectrometer
CRYBOX	LAMPF crystal array detector
CRYS-BALL	SLAC-SPEAR and DESY-DORIS large solid angle neutral detector
CUSB	CESR high resolution calorimeter
DELCO	SLAC-SPEAR and PEP detector system
EHS	European hybrid spectrometer at CERN-SPS
EMS	CERN-SPS European muon collaboration detector
EPICS	LAMPF energetic pion spectrometer and detection system
FMPS	Fermilab multiparticle spectrometer
GAMS	gamma spectrometer at Serpukhov
HPW	Harvard-Penn-Wisconsin neutrino detector at BNL
HRS	SLAC-PEP high resolution spectrometer
JADE	DESY-PETRA spectrometer system
JANUS	LAMPF proton polarimeter
LAB-E	FNAL target-calorimeter muon-spectrometer detector for neutrino physics
LAHRS	LAMPF high resolution proton spectrometer
LASS	SLAC large aperture solenoid spectrometer
LENA	DESY-DORIS detector system
MAC	SLAC-PEP magnetic calorimeter
MARK-II	SLAC-SPEAR and PEP spectrometer system
MARK-III	SLAC-SPEAR spectrometer system (not related to MARK-II)
MARK-J	DESY-PETRA spectrometer system
MPS	BNL multiparticle spectrometer
MPS-II	upgraded BNL MPS
OMEGA	CERN OMEGA spectrometer
OMEGAPRIME	upgraded CERN OMEGA spectrometer
PLUTO	DESY-DORIS and PETRA superconducting solenoid spectrometer
RMS	Rutherford multiparticle spectrometer, now at CERN
SFM	CERN-ISR split field magnet
SIGMA	CERN-IHEP magnetic spectrometer at Serpukhov
SSF	SLAC spectrometer facility - 1.6, 8, and/or 20 GeV
SUPERBENKEI	KEK superconducting magnetic spectrometer
TASSO	DESY-PETRA spectrometer system
TELAS	KEK target-embodied large-aperture spectrometer
TOPAZ	KEK-TRISTAN solenoidal spectrometer with TPC
TPC	SLAC-PEP time projection chamber
UA1	CERN-PBAR/P detector
UA2	CERN-PBAR/P detector
VENUS	KEK-TRISTAN spectrometer
2-GAMMA	SLAC-PEP detector to study 2-gamma process

PARTICLE VOCABULARY

ABARYON			unspecified antibaryon
ACHARM			particle with negative charm
ADEUT			antideuteron
AD0			charmed meson (C=-1)
AG			silver nucleus
AHE			anti-helium-4 nucleus
AHE3			anti-helium-3 nucleus
AK0			S=-1 K0
AK*(UNSPEC)0			unspecified S=-1 neutral K*
AL			aluminum nucleus
ALAMBDA			antilambda
AN			antineutron
ANNIHIL			pure annihilation final state in nucleon-antinucleon scattering
ANU			antineutrino
ANUCLEON			antinucleon
ANUCLEUS			general antinucleus
ANUE			electron antineutrino
ANUMU			muon antineutrino
ANUTAU			tau antineutrino
ANYTHING			
AP			antiproton
AQUARK(1/3)			antiquark
AQUARK(2/3)			antiquark
AR			argon nucleus
ASIGMA0	ASIGMA+	ASIGMA-	antisigma
ASTRANGE			unspecified S=+1 particle
ATRIT			anti-tritium nucleus
AU			gold nucleus
AXION			hypothesized light Higgs scalar boson
AXI0	AXI+		anti-xi
A+			baryon with quark content usc
A0			baryon with quark content dsc
A1(1270)0	A1(1270)+	A1(1270)-	
A2(1320)0	A2(1320)+	A2(1320)-	
A3(1680)0	A3(1680)+	A3(1680)-	
BARYON			unspecified baryon
BARYONIUM			meson coupling mainly to baryon-antibaryon
BE			beryllium nucleus
BEAUTY			particle with nonzero beauty (or bottom)
BOR12			boron-12
B(1235)0	B(1235)+	B(1235)-	
B(5200)			meson with beauty
C			carbon nucleus
CA			calcium nucleus
CD			cadmium nucleus
CENTAURO			final state with 50 or more charged particles, no pi0's
CHARGED			charged particle
CHARGED+			positive charged particle

PARTICLE VOCABULARY (CONT'D)

CHARGED-			negative charged particle
CHARM			unspecified particle with charm
CHARMED-BARYON			unspecified baryon with charm
CHI(UNSPEC)0			unspecified radiative decay product of psi(3685)
CHI(3510)			radiative decay product of psi(3685)
CHI(3550)			radiative decay product of psi(3685)
CHI/B(10246)			radiative decay product of high mass upsilons
CHI/B(UNSPEC)			unspecified radiative decay product of high mass upsilons
CR			chromium nucleus
CU			copper nucleus
C12			carbon-12 nucleus
C*(4.44)			4.44 keV excited state of carbon
DD			diffraction dissociation; followed by particles so produced, e.g. DD <P P10>
DELTA(980)0	DELTA(980)+	DELTA(980)-	
DEL-			DEL(1232P33)-
DEL0			DEL(1232P33)0
DEL+			DEL(1232P33)+
DEL++			DEL(1232P33)++
DEL(UNSPEC)0			unspecified I=3/2 baryon
DEL(UNSPEC)++			unspecified I=3/2 baryon
DEMON			exotic-3 diquark deuteron-like state
DEUT			deuteron
DIBARYON			unspecified S=0 dibaryon resonance
DIHYPERON			unspecified S=-2 dihyperon resonance
D0			charmed meson
D+			charmed meson
D-			charmed meson
D*(2010)			charmed meson
D*(2010)+			charmed meson
D*(2010)-			charmed meson
D(UNSPEC)			unspecified charmed meson
D(1285)			
EPSILON			pi-pi S-wave
ETA			
ETAPRIME			recurrence of the eta
ETAPRIME/C			recurrence of the eta/c
ETA/C			lowest mass JP=0- charmonium state
EXOTIC-MESON			cannot be formed of quark-antiquark
EXOTIC-NUCLEON			cannot be formed of three quarks
E+			positron
E+-			electron or positron
E-			electron
E(1420)			
F			f(1270) meson resonance
FE			iron nucleus
FPRIME			
FRAG			nuclear fragment

PARTICLE VOCABULARY (CONT'D)

F1(1540)0 F1(1540)+ F1(1540)-  
 F+ charmed strange meson  
 F- charmed strange meson  
 GAMMA any photon  
 GLUEBALL  
 GLUON  
 HADRON unspecified hadron  
 HADRON+ positive hadron  
 HADRON- negative hadron  
 HE helium-4 nucleus  
 HE3 helium 3  
 HIGGS Higgs boson  
 HYPERNUC hypernucleus  
 HVY-LEPTON general heavy lepton  
 HVY-NEUTRINO heavy neutrino  
 HVY-NUE  
 HVY-NUMU  
 H(2040) I=0, JP=4+ meson resonance  
 INELASTIC same as ANYTHING, except elastic excluded  
 IR iridium nucleus  
 JET jet detected as a whole  
 J/PSI  
 KAON unspecified kaon or antikaon  
 KL K long  
 KS K short  
 K0 K+  
 K-  
 K\*(UNSPEC) unspecified K\*  
 K\*(UNSPEC)0 unspecified K\*  
 K\*(892)0 K\*(892)+ K\*(892)-  
 K\*(1430)0 K\*(1430)+ K\*(1430)-  
 LAMBDA  
 LAMBDA/C+ charmed baryon  
 LAM(UNSPEC) I=0, S=-1 baryon  
 LAM(1330B) unverified bump at 1330 MeV  
 LAM(1520D03)  
 LEPTON unspecified lepton  
 LI6 LI7 lithium nuclei  
 LONGLIVED stable under strong or electromagnetic decay;  
 mass and other quantum numbers not specified  
 unspecified meson  
 MESON unspecified neutral meson  
 MESON(UNSPEC)0 unspecified charge+1 meson  
 MESON(UNSPEC)+ unspecified charge-1 meson  
 MESON(UNSPEC)-  
 MG magnesium nucleus  
 MONOPOLE magnetic monopole  
 MUON mu+ or mu-  
 MU+ MU-  
 N neutron

PARTICLE VOCABULARY (CONT'D)

NE neon nucleus  
 NEUTRAL neutral particle  
 NIT12 nitrogen-12 nucleus  
 NNBAR(2020)0 nucleon-antinucleon state  
 NNBAR(2200)0 nucleon-antinucleon state  
 NU neutrino  
 NUCLEON nucleon  
 NUCLEUS general nucleus  
 NUE electron neutrino  
 NUMU muon neutrino  
 NUTAU tau neutrino  
 N\*5/2(UNSPEC) unspecified I=5/2, S=0 baryon  
 N\*(UNSPEC)0 unspecified S=0 baryon  
 N\*(UNSPEC)+ unspecified S=0 baryon  
 N(UNSPEC)0 unspecified I=1/2, S=0 baryon  
 N(UNSPEC)+ unspecified I=1/2, S=0 baryon  
 N(1520D13)0 N(1520D13)+  
 N(1675D15)0 N(1675D15)+  
 O oxygen nucleus  
 OMEGA meson resonance  
 OMEGA- S=-3 baryon  
 OMEGA\*(UNSPEC) unspecified S=-3 baryon resonance  
 OMEGA\*(UNSPEC)- unspecified S=-3 baryon resonance  
 P proton  
 PB lead nucleus  
 PHI  
 PHIPRIME recurrence of the phi  
 PION pion of unspecified charge  
 P10  
 PI+  
 PI+- charged pion  
 PI-  
 PRONG a charged prong  
 PSI(UNSPEC) unspecified JP=1- charmonium state  
 PSI(3685)  
 PSI(3770)  
 QUARK unspecified quark  
 QUARK(1/3) quark  
 QUARK(2/3) quark  
 RHO0 RHO+ RHO-  
 RHOPRIME(1550)0 RHOPRIME(1550)+ RHOPRIME(1550)-  
 SI silicon nucleus  
 SIGMA0 SIGMA+ SIGMA-  
 SIGMA/C++ I=1 charmed baryon  
 SIG(UNSPEC)0 unspecified I=1, S=-1 particle  
 SIG(UNSPEC)+ unspecified I=1, S=-1 particle  
 SIG(UNSPEC)- unspecified I=1, S=-1 particle  
 SIG(1385P13)0 SIG(1385P13)+ SIG(1385P13)-  
 SN tin nucleus

## PARTICLE VOCABULARY (CONT'D)

STRANGE	unspecified strange particle
STRANGEONIUM	meson whose quark content is dominantly s-sbar, such as the phi
S+	intermediate scalar boson
S-	intermediate scalar boson
S*(975)	pi-pi or K-Kbar S-wave
S(1935)0 S(1935)+ S(1935)-	
TACHYON	
TAU	heavy lepton
TAU+	positive heavy lepton
TAU-	negative heavy lepton
TOPONIUM	top-antitop state
TRIT	tritium nucleus
TRUTH	particle with nonzero truth (or top)
U	uranium nucleus
UNSPEC	particle of unspecified type
UPSI(UNSPEC)	unspecified upsilon particle
UPSI(9460)	
UPSI(10020)	
UPSI(10350)	
UPSI(10570)	
VEE	unspecified neutral strange particle decay
VMESON	unspecified vector meson
VMESON0	unspecified vector meson
WATER	
WT	tungsten nucleus -- note name is not same as chemical symbol
W0	intermediate vector boson
W+	intermediate vector boson
W-	intermediate vector boson
XE	xenon nucleus
XI0 XI-	
XI*(UNSPEC)0	unspecified S=-2 baryon
XI*(UNSPEC)-	unspecified S=-2 baryon
XI(UNSPEC)0	unspecified I=1/2, S=-2 baryon
XI(UNSPEC)-	unspecified I=1/2, S=-2 baryon
XI(1530P13)0 XI(1530)-	
XI(1820)0 XI(1820)-	
XI(1940)0 XI(1940)-	
Y0	neutral strange particle
Y*(UNSPEC)0	unspecified S=-1 baryon
Y*(UNSPEC)+	unspecified S=-1 baryon
Y*(UNSPEC)-	unspecified S=-1 baryon
Z0	neutral weak gauge boson
Z*(UNSPEC)0	unspecified exotic S=+1 baryon

## INSTITUTIONS

AACH	Phys. Inst. der Tech. Hochschule	Aachen, Germany
AARH	Aarhus Univ.	Aarhus, Denmark
ABAD	Abadan Inst. of Technology	Abadan, Iran
ABLC	Abilene Christian Univ.	Abilene, TX, USA
AICH	Aichi Educational Univ.	Toyota, Aichi Pref., Japan
AKIT	Akita Univ.	Akita, Japan
ALBA	State Univ. of New York at Albany	Albany, NY, USA
ALBE	Alberta Univ., NRC	Edmonton, Alb., Canada
ALMA	Kazakh Inst. for High Energy Physics	Alma-Ata, USSR
AMER	American Univ.	Washington, DC, USA
AMES	Ames Lab	Ames, Iowa, USA
AMST	Univ. of Amsterdam	Amsterdam, Netherlands
ANIK	Amsterdam Nikhef	Amsterdam, Netherlands
ANL	Argonne Nat. Lab.	Argonne, Ill., USA
ANPL	Athens Univ., Nucl. Phys. Lab.	Athens, Greece
ARIZ	Univ. of Arizona	Tucson, Ariz., USA
ATEN	Nuclear Res. Centre Demokritos	Athens, Greece
AUCK	Auckland Univ.	Auckland, New Zealand
BARI	Univ. di Bari	Bari, Italy
BASL	Basel Univ.	Basel, Switzerland
BEDF	Bedford College	London, England
BELG	Inst. Interuniv. des Sci. Nuclear	Bruxelles, Belgium
BERG	Fysisk Institut	Bergen, Norway
BERL	Inst. Hochenergiephys. DAW	Zeuthen/Berlin, DDR
BERN	Univ. Bern	Bern, Switzerland
BGNA	Univ. di Bologna	Bologna, Italy
BHEP	Inst. of High Energy Physics	Beijing, China
BIEL	Univ. Bielefeld	Bielefeld, Germany
BIRK	Birkbeck College	London, England
BIRM	Birmingham Univ.	Birmingham, England
BLOO	Bloomsburg State Coll.	Bloomsburg, PA, USA
BNL	Brookhaven National Lab.	Upton, L.I., NY, USA
BOHR	Niels Bohr Institute	Copenhagen, Denmark
BONN	Univ. Bonn	Bonn, Germany
BOST	Boston Univ.	Boston, Mass., USA
BRAN	Brandeis Univ.	Waltham, Mass., USA
BRCO	British Columbia Univ.	Vancouver, Canada
BRIS	H. H. Wills Phys. Lab., U. of Bristol	Bristol, England
BROW	Brown Univ.	Providence, RI, USA
BRUX	Univ. Libre de Bruxelles	Bruxelles, Belgium
BTL	Bell Telephone Labs.	Murray Hill, NJ, USA
BUDA	Central Research Institute of Physics	Budapest, Hungary
CAEN	Lab. de Phys. Corpusculaire	Caen, France
CAGL	Calgary Univ.	Calgary., Alb., Canada
CAMB	Cambridge Univ.	Cambridge, England
CAPE	Univ. of Cape Town	Cape Town, S. Africa
CARL	Carleton Univ.	Ottawa, Canada
CASE	Case Western Reserve Univ.	Cleveland, Ohio, USA
CATH	Catholic Univ. of America	Washington DC, USA

INSTITUTIONS (CONT'D)

CAVE Cavendish Lab., Cambridge Univ. Cambridge, England  
 CBPF Centro Bras. Pesquisas Fisicas Rio de Janeiro, Brazil  
 CDEF College de France Paris, France  
 CENG CEN, Grenoble Grenoble, France  
 CERN European Org. for Nuclear Research Geneva, Switzerland  
 CHIC Univ. of Chicago Chicago, Ill., USA  
 CINC Univ. of Cincinnati Cincinnati, Ohio, USA  
 CIPP Canadian Inst. of Particle Physics Montreal, Canada  
 CIT Calif. Institute of Technology Pasadena, Calif., USA  
 CLER Univ. de Clermont-Ferrand Clermont-Ferrand, France  
 CLEV Cleveland State Univ. Cleveland, OH, USA  
 CMU Carnegie-Mellon Univ. Pittsburgh, PA, USA  
 CNRC Canadian National Research Council Ottawa, Canada  
 COLC Colorado College Colorado Springs, CO, USA  
 COLO Univ. of Colorado Boulder, Colo., USA  
 COLU Columbia Univ. New York, NY, USA  
 COPE Copenhagen Univ. Copenhagen, Denmark  
 CORN Cornell Univ. Ithaca, NY, USA  
 COSU Colorado State Univ. Fort Collins, CO, USA  
 CRAC Inst. for Nuclear Research Cracow, Poland  
 CRNL Chalk River Nuclear Lab. Chalk River, Canada  
 CUNY City Univ. of New York New York, NY, USA  
 CURI Pierre et Marie Curie Univ., Paris VI Paris, France  
 CWSH Central Washington Univ. Ellensburg, WA, USA  
 DESY Deutsches Elektronen-Synch. Hamburg, Germany  
 DLFT Technische Hogeschool Delft, Netherlands  
 DOE Department of Energy Washington D.C., USA  
 DORT Univ. Dortmund Dortmund-Hornbruch, Germany  
 DUKE Duke Univ. Durham, NC, USA  
 DUUC University College Dublin, Ireland  
 EDIN Univ. of Edinburgh Edinburgh, Scotland  
 EFI Enrico Fermi Inst. for Nuclear Studies Chicago, Ill., USA  
 ELMT Elmhurst College Elmhurst, Ill., USA  
 EPOL Ecole Polytechnique Palaiseau, France  
 ERLA Univ. Erlangen Erlangen, Germany  
 ETHZ Swiss Federal Inst. of Technology Zurich, Switzerland  
 FIRZ Univ. di Firenze Firenze, Italy  
 FKUU Fukui Univ. Fukui, Japan  
 FNAL Fermi National Accelerator Lab. Batavia, Ill., USA  
 FNRS Belgium Belgium  
 FRAS Lab. Nazionali del Sincrotrone Frascati, Italy  
 FREI Univ. Freiburg Freiburg, Germany  
 FSU Florida State Univ. Tallahassee, Fla., USA  
 GENE State Univ. of New York, Geneseo Geneseo, NY, USA  
 GENO Univ. di Genova Genova, Italy  
 GESC General Electric R and D Center Schenectady, NY, USA  
 GEVA Univ. de Geneve Geneva, Switzerland  
 GLAS Univ. of Glasgow Glasgow, Scotland  
 GMAS George Mason Univ. Fairfax, VA, USA

INSTITUTIONS (CONT'D)

GREN Grenoble Univ. Grenoble, France  
 GUIL Univ. of Surrey at Guilford Guilford, Surrey, England  
 HAIF Technion - Israel Inst. of Technology Haifa, Israel  
 HAMB Univ. Hamburg Hamburg, Germany  
 HARV Harvard Univ. Cambridge, Mass., USA  
 HAWA Univ. of Hawaii Honolulu, Hawaii, USA  
 HEID Univ. Heidelberg Heidelberg, Germany  
 HELS Helsingin Yliopisto Helsinki, Finland  
 HIRO Hiroshima Univ. Hiroshima, Japan  
 HOUS Univ. of Houston Houston, Texas, USA  
 HOWD Howard Univ. Washington, DC, USA  
 IDAH Univ. of Idaho Moscow, ID, USA  
 IIT Illinois Inst. of Tech. Chicago, Ill., USA  
 ILL Univ. of Illinois Urbana, Ill., USA  
 ILLC Univ. of Illinois at Chicago Chicago, Ill., USA  
 IND Univ. of Indiana Bloomington, Ind., USA  
 INNS Innsbruck Univ. Innsbruck, Austria  
 INUS Inst. for Nuclear Study at Tokyo Univ. Tokyo, Japan  
 IOAN Univ. of Ioannina Ioannina, Greece  
 IOWA Univ. of Iowa Iowa City, Iowa, USA  
 IPN Inst. de Phys. Nucleaire Orsay, France  
 IRPA Intercampus Inst. for Res. at Part. Acc. USA  
 ISU Iowa State Univ. Ames, Iowa, USA  
 ITEP Inst. for Teor. and Exp. Physics Moscow, USSR  
 JAPN Japan Univ. Group Collaboration Japan  
 JHU Johns Hopkins Univ. Baltimore, Md., USA  
 JINR Joint Inst. for Nuclear Research Dubna, USSR  
 KANS Univ. of Kansas Lawrence, Kansas, USA  
 KARL Technische Univ. Karlsruhe Karlsruhe, Germany  
 KEK Nat. Lab for High Energy Phys., Japan Tsukuba-gun, Japan  
 KFAJ KFA Julich Julich, Germany  
 KFZK Kernforschungszentrum, Karlsruhe Leopoldshaven, Germany  
 KHSU Kharkov State Univ. Kharkov, USSR  
 KIAE Kurchatov Inst. of Atomic Energy Moscow, USSR  
 KIEL Kiel Univ. Kiel, Germany  
 KIMC Industrial Medical College Kitakyushu, Japan  
 KOBE Kobe Univ. Kobe, Japan  
 KOSI Czech. Acad. Sci. Inst. Exp. Phys. Kosice, Czechoslovakia  
 KYOE Kyoto U. of Education Kyoto, Japan  
 KYOT Kyoto Univ. Kyoto, Japan  
 LALO Linear Accelerator Lab, Orsay Orsay, France  
 LANC Lancaster Univ. Lancaster, England  
 LANL Los Alamos National Lab. Los Alamos, NM, USA  
 LAPP Lapp Univ. Annecy, France  
 LAUS Univ. of Lausanne Lausanne, Switzerland  
 LBL U. C. Lawrence Berkeley Lab. Berkeley, Calif., USA  
 LEBD Lebedev Physics Inst. Moscow, USSR  
 LEHI Lehigh Univ. Bethlehem, PA, USA  
 LENI Inst. of Nucl. Phys., Akad. Nauk USSR Leningrad, USSR

INSTITUTIONS (CONT'D)

LIBH	Lab Interuniv. Belge High Energy	Brussels, Belgium
LISB	Nova Univ. de Lisbon	Lisbon, Portugal
LIVP	Liverpool Univ.	Liverpool, England
LJUB	Univ. of Ljubljana	Ljubljana, Yugoslavia
LOIC	Imperial Col. of Science and Tech.	London, England
LOQM	Queen Mary College	London, England
LOUC	University College	London, England
LOWC	Westfield College	London, England
LPGP	Lab. de Phys. General, Univ. Paris	Paris, France
LSBF	Lisbon Inst. Fisica	Lisbon, Portugal
LSU	Louisiana State Univ.	Baton Rouge, LA, USA
LUMI	Centre Univ. de Luminy	Marseille, France
LUND	Lund Univ.	Lund, Sweden
LVLN	Univ. Catholique de Louvain	Louvain-la-Neuve, Belg.
LYON	Inst. de Phys. Nucl., Univ. de Lyon	Villeurbanne, France
MADR	Junta de Energia Nuclear	Madrid, Spain
MANI	Univ. of Manitoba	Winnipeg, Canada
MANZ	Univ. Mainz	Mainz, Germany
MASA	Univ. of Massachusetts	Amherst, Mass., USA
MCGI	McGill Univ.	Montreal, Canada
MCHS	Univ. Manchester	Manchester, England
MEXU	Univ. Nac. Autonoma de Mexico	Mexico City, Mexico
MIAM	Miami Univ.	Miami, FL, USA
MICH	Univ. of Michigan	Ann Arbor, Mich., USA
MILA	Univ. di Milano	Milano, Italy
MINN	Univ. of Minnesota	Minneapolis, Minn., USA
MINR	Institute for Nuclear Research	Moscow, USSR
MIT	Massachusetts Inst. of Technology	Cambridge, Mass., USA
MONS	Univ. de l'Etat, Mons	Mons, Belgium
MONT	Montreal Univ.	Montreal, Que., Canada
MOSU	Moscow State Univ. Inst. of Nucl. Phys.	Moscow, USSR
MPEI	Moscow Phys. Eng. Inst.	Moscow, USSR
MPIH	Max-Planck-Inst. fur Phys.-Astrophys.	Heidelberg, Germany
MPIM	Max-Planck-Inst. fur Phys.-Astrophys.	Munich, Germany
MSU	Michigan State Univ.	East Lansing, Mich., USA
MTHO	Mt. Holyoke College	South Hadley, Mass., USA
MUNI	Munich Univ.	Munich, Germany
MUNT	Technische Univ. Munich	Munich, Germany
NADI	Mohamed El-Nadi Research Center	Cairo, Egypt
NAGO	Nagoya Univ.	Nagoya, Japan
NANC	Univ. de Nancy	Nancy, France
NAPL	Univ. di Napoli	Napoli, Italy
NARA	Nara Women's Univ.	Nara, Japan
NARU	Nara Univ.	Nara, Japan
NCSU	North Carolina State U.	Raleigh, NC, USA
NDAM	Univ. of Notre Dame	Notre Dame, Ind., USA
NEAS	Northeastern Univ.	Boston, Mass., USA
NEUC	Univ. of Neuchatel	Neuchatel, Switzerland
NEVI	Nevis Lab.	Irvington-on-Hudson, NY, USA

INSTITUTIONS (CONT'D)

NIFS	Ist. di Fis. Sperimentale	Napoli, Italy
NIHN	Nihon Univ.	Tokyo, Japan
NIIG	Niigata Univ.	Niigata, Japan
NIJM	R. K. Univ. Nijmegen	Nijmegen, Netherlands
NILU	Northern Illinois Univ.	Dekalb, Ill., USA
NMXS	New Mexico State Univ.	Las Cruces, NM, USA
NNIK	Nijmegen NIKHEF	Nijmegen, Netherlands
NOVO	Inst. of Nuclear Physics	Novosibirsk, USSR
NRL	Naval Research Laboratory	Washington, D.C., USA
NRLO	Naval Research Lab	Orlando, FL, USA
NSF	National Science Foundation	Washington, D.C., USA
NTUA	National Technical Univ. of Athens	Athens, Greece
NWES	Northwestern Univ.	Evanston, Ill., USA
NYU	New York Univ.	New York, NY, USA
OAKM	Oakland Univ.	Oakland, Mich., USA
OKAY	Okayama Univ.	Okayama, Japan
OKLN	Oklahoma Univ.	Norman, OK, USA
OPEN	Open Univ.	Milton Keynes, England
OREC	Oregon State Univ.	Corvallis, OR, USA
OREG	Univ. of Oregon	Eugene, OR, USA
ORNL	Oak Ridge National Lab.	Oak Ridge, Tenn., USA
ORSA	Univ. de Paris, Fac. des Science	Orsay, France
OSAK	Osaka Univ.	Osaka, Japan
OSKC	Osaka City Univ.	Osaka, Japan
OSLO	Oslo Univ.	Oslo, Norway
OSSE	Science Educ. Inst. of Osaka Pref.	Osaka, Japan
OSU	Ohio State Univ.	Columbus, Ohio, USA
OTTA	Univ. of Ottawa	Ottawa, Canada
OXF	Oxford Univ.	Oxford, England
PADO	Univ. di Padova	Padova, Italy
PAVI	Univ. di Pavia	Pavia, Italy
PENN	Univ. of Pennsylvania	Philadelphia, PA, USA
PISA	Univ. di Pisa	Pisa, Italy
PITT	Univ. of Pittsburgh	Pittsburgh, PA, USA
PRAG	Institute of Physics, CSAV	Prague, Czechoslovakia
PRIN	Princeton Univ.	Princeton, NJ, USA
PURD	Purdue Univ.	Lafayette, Ind., USA
QUNK	Queen's Univ.	Kingston, Ont., Canada
REHO	Weizmann Inst. of Science	Rehovoth, Israel
RHEL	Rutherford High Energy Lab.	Chilton, Did., Oxon., England
RICE	William Marsh Rice Univ.	Houston, Texas, USA
RIKK	Rikkyo University	Rikkyo, Japan
ROCH	Univ. of Rochester	Rochester, NY, USA
ROCK	Rockefeller Univ.	New York, NY, USA
ROMA	Univ. di Roma	Roma, Italy
RUTG	Rutgers Univ.	New Brunswick, NJ, USA
SACL	Center d'Etudes Nuclear Saclay	Gif-sur-Yvette, France
SACR	Cal State, Sacramento	Sacramento, CA, USA
SAGA	Saga Univ.	Saga, Japan

INSTITUTIONS (CONT'D)

SAIT	Saitama Univ.	Saitama, Japan
SANT	Univ. de Santander	Santander, Spain
SASK	Univ. of Saskatchewan	Saskatoon, Canada
SCUC	Univ. of South Carolina at Columbia	Columbia, SC, USA
SEOU	Korea Univ. at Seoul	Seoul, S. Korea
SERP	Inst. of High Energy Physics	Serpukhov, USSR
SHAN	Shandoong Univ.	Jinan, Shandong, China
SHEF	Univ. of Sheffield	Sheffield, Yorks., England
SHIR	Shiraz U.	Shiraz, Iran
SHMP	Univ. of Southampton	Southampton, England
SIEG	Siegen Univ.	Huttental, Germany
SIEM	Siemens Schuckertwerke AG	Erlangen, Germany
SLAC	Stanford Linear Accel. Center	Stanford, Calif., USA
SMAS	Southeastern Massachusetts Univ.	North Dartmouth, Mass., USA
SOFC	High Inst. of Chem. Tech.	Sofia, Bulgaria
SOFI	Bulgarian Acad. of Science	Sofia, Bulgaria
SRIP	State Res. Inst. Photochem. Proj.	Moscow, USSR
STAN	Stanford Univ.	Stanford, Calif., USA
STEV	Stevens Inst. of Tech.	Hoboken, NJ, USA
STOH	Stockholm Univ.	Stockholm, Sweden
STON	State Univ. of New York at Stonybrook	Stonybrook, LI, NY, USA
STRB	Centre des Res. Nucleaires	Strasbourg, France
SWRK	Inst. of Nuclear Research	Swierk, Poland
SYDN	Univ. of Sydney	Sydney, Australia
SYRA	Syracuse Univ.	Syracuse, NY, USA
TAMU	Texas A and M Univ.	College Station, TX, USA
TATA	Tata Inst. of Fundamental Research	Bombay, India
TBSU	Tbilisi State Univ.	Tbilisi, USSR
TELA	Univ. of Tel-Aviv	Tel-Aviv, Israel
TEMP	Temple Univ.	Philadelphia, PA, USA
TENN	Univ. of Tennessee	Knoxville, Tenn., USA
TEXA	Univ. of Texas at Austin	Austin, TX, USA
THES	Univ. of Thessaloniki	Thessaloniki, Greece
TMSK	Nucl. Phys. Inst., Tomsk Polytech. Inst.	Tomsk, USSR
TMU	Tokyo Metropolitan Univ.	Tokyo, Japan
TNTO	Univ. of Toronto	Toronto, Canada
TOCR	Cosmic Ray Lab, Tokyo Univ.	Tokyo, Japan
TOGA	Tohoku-Gakuin Univ.	Miyagi, Japan
TOHO	Tohoku Univ.	Sendai, Japan
TOKY	Univ. of Tokyo	Tokyo, Japan
TORI	Univ. di Torino	Torino, Italy
TRIU	TRIUMF, Univ. of British Columbia	Vancouver, Canada
TRST	Univ. di Trieste	Trieste, Italy
TSUK	Tsukuba Univ.	Ibaraki, Japan

INSTITUTIONS (CONT'D)

TUAT	Tokyo Univ. of Agriculture and Tech.	Tokyo, Japan
TUFT	Tufts Univ.	Medford, Mass., USA
UATH	Univ. of Athens	Athens, Greece
UBEL	Univ. of Belgrade	Belgrade, Yugoslavia
UCB	Univ. of Calif. at Berkeley	Berkeley, Calif., USA
UCD	Univ. of Calif. at Davis	Davis, Calif., USA
UCI	Univ. of Calif. at Irvine	Irvine, Calif., USA
UCLA	Univ. of Calif. at Los Angeles	Los Angeles, Calif., USA
UCR	Univ. of Calif. at Riverside	Riverside, Calif., USA
UCSB	Univ. of Calif. at Santa Barbara	Santa Barbara, Calif., USA
UCSC	Univ. of Calif. at Santa Cruz	Santa Cruz, Calif., USA
UCSD	Univ. of Calif. at San Diego	La Jolla, Calif., USA
UMAD	Univ. de Madrid	Madrid, Spain
UMD	Univ. of Maryland	College Park, MD, USA
UNM	Univ. of New Mexico	Albuquerque, New Mex., USA
UTAH	Univ. of Utah	Salt Lake City, Utah, USA
UTRE	University of Utrecht	Utrecht, Netherlands
UUPP	Univ. of Uppsala	Uppsala, Sweden
VALE	Univ. de Valencia	Valencia, Spain
VAND	Vanderbilt Univ.	Nashville, Tenn., USA
VASC	Virginia State Coll.	Petersburg, VA, USA
VASS	Vassar College	Poughkeepsie, NY, USA
VICT	Victoria Univ.	Victoria, BC, Canada
VIEN	Inst. for High En. Phys., A. A. S.	Vienna, Austria
VILL	SIN, Villigen Univ. High Energy Physics	Villigen, Switzerland
VIRG	Univ. of Virginia	Charlottesville, VA, USA
VPI	Virginia Polytechnic Inst.	Blacksburg, VA, USA
VRIJ	Vrije Univ.	Amsterdam, Netherlands
WARS	Univ. of Warsaw	Warsaw, Poland
WASH	Univ. of Washington	Seattle, Wash., USA
WIEN	Univ. Wien	Vienna, Austria
WILL	College of William and Mary	Williamsburg, VA, USA
WINR	Warsaw Inst. of Nuclear Research	Warsaw, Poland
WISC	Univ. of Wisconsin	Madison, Wisc., USA
WSUP	Washington State Univ.	Pullman, WA, USA
WUPP	Univ. Wuppertal	Wuppertal, Germany
WURZ	Wurzburg Univ.	Wurzburg, Germany
WYOM	Univ. of Wyoming	Laramie, Wyoming, USA
YALE	Yale Univ.	New Haven, Conn., USA
YERE	Yerevan Physics Inst.	Yerevan, Armenia, USSR
YOKO	Yokohama National Univ.	Yokohama, Japan
YORK	York University	Downsview, Ont., Canada
ZAGR	Inst. Ruder Boskovic, Zagreb	Zagreb, Yugoslavia
ZURI	Zurich University	Zurich, Switzerland



**BROOKHAVEN AGS BEAMS** (Source: G. Bunce, BNL)

Up to  $10^{13}$  protons per pulse are accelerated typically to 28.5 GeV kinetic energy (31 GeV has been obtained). At 28.5 GeV, the period is 2.4 sec for slow extraction (with a 1-sec flat-top), or 1.4 sec for fast extraction (used for neutrino beams). Counting rates may be estimated using the nominal beam spill time of 1 sec.

Beam	Momentum range (GeV/c)	$\pm\Delta p/p$ (%)	Production angle ( $^\circ$ )	Solid angle (msr)	Beam length (m)	Particles	Flux in thousands per $10^{12}$ protons $\rightarrow$ on target	at (GeV/c)	Comments
B4	1.5-6	3	3	0.3	81	$K^+/K^-$	270/120	4	Usually $2 \times 10^{12}$ ppp on target; $\pi/K \sim 3$ in K beam; $\pi/\bar{p} \sim 3/4$
	1.5-9					$\bar{p}$	100		
B2	- same characteristics as B4 above -							To multiparticle spectrometer	
C2, C4	$\leq 1.1$	2	10.5	2.6	15	$K^+/K^-$	40/12	0.75	Usually $2 \times 10^{12}$ ppp; $\pi/K \sim 10$ in K beam
						$\bar{p}$	2		
						$\pi^+/\pi^-$	$8 \times 10^4$		
C6, C8	$\leq 0.8$	2.5	5	15	15	$K^+/K^-$	200/60	0.75	Usually $2 \times 10^{12}$ ppp; $\pi/K \sim 20$
						$\bar{p}$	14		
						$\pi^+/\pi^-$	$6 \times 10^5$		
A1	5-24	1.5	0	0.2	130	$\pi^-$	1000	22	To multiparticle spectrometer; $10^{12}$ ppp; 25 cm Be target
B1	5-24	3	0	0.3	75	$K^+/K^-$	2500/700	10	Usually $2 \times 10^{12}$ ppp
						$p/\bar{p}$	$1.5 \times 10^5/200$		
						$\pi^+/\pi^-$	$6 \times 10^4/3 \times 10^4$		
C1	5-24	5	0	0.8	61	$K^+/K^-$	9000/400	16	Usually $2 \times 10^{12}$ ppp; $\mu/\pi \sim 3\%$ in $\pi$ beam
						$p/\bar{p}$	$3 \times 10^4/30$		
						$\pi^+/\pi^-$	$10^5/3 \times 10^4$		
D2	0.1-0.3( $\pi$ ) 0.05-0.15( $\mu$ )	9( $\pi$ )	55( $\pi$ )	50( $\pi$ )	9	$\mu^-$	2000	0.10	Muon channel; flux in $100 \text{ cm}^2$ with $\Delta p/p = \pm 2\%$ ; design intensity
A3	1-28		0	0.0035	8	$K_L$	2000	1-28	Typically $10^{11}$ ppp; alternates with A1; design intensity
						n	$10^5$		
B5	6-28		0	0.01	6	n	$10^5$	6-28	Typically $10^{12}$ ppp; design intensity
U	1.5 (peak)					$\nu/\bar{\nu}$	$10^7/7 \times 10^6$ per $\text{m}^2$		Typically $9 \times 10^{12}$ ppp; flux averaged over 0.7 m radius

Separated

Unseparated

Neutral

**CERN PS BEAMS** [Source: *Experiments at CERN in 1982*, D.R.O. Morrison (editor)]

**East Area** -- These are the primary beams.

Beam	Momentum (GeV/c)	Particles	Flux/cycle	Comments
e <sub>15</sub>	8-24	p	$\geq 3 \times 10^{12}$	Slow ejection; splits into three branches
e <sub>18</sub>	$\leq 22$	p	$\geq 5 \times 10^{12}$	Fast ejection

**East Area** -- These are counter beams. They are all fed by branches of the e<sub>15</sub> beam above. The fluxes are for  $\Delta p/p = \pm 1\%$  and  $10^{12}$  24-GeV/c protons on the external target; they assume 30% target efficiency (fluxes also depend on the external target used). The first two beams are enriched by electrostatic separation.

Beam	Momentum (GeV/c)	Particles	Flux/cycle	Comments
k <sub>26</sub>	$\leq 0.55$	K <sup>-</sup>	$4 \times 10^3$	Flux at 0.55 GeV/c
k <sub>23</sub>	0.5-1.0	$\bar{p}$	$5 \times 10^3$	Flux at 0.8 GeV/c; for tests
c <sub>13</sub>	$\leq 12$	p	$3 \times 10^6$	Fluxes (design values) at 10 GeV/c; for equipment tests
	"	$\pi^+$	$6 \times 10^5$	
	$\leq 18$	$\pi^-$	$2 \times 10^5$	
t <sub>6</sub>	$\leq 18$	p	$5 \times 10^5$	Fluxes (design values) at 18 GeV/c; for equipment tests
	"	$\pi^+$	$5 \times 10^3$	
	"	$\pi^-$	$2 \times 10^3$	
	"	$\pi^-$	$3 \times 10^5$	
t <sub>7</sub>	1-10	p, $\pi^+$ , e <sup>+</sup> $\pi^-$ , e <sup>-</sup>		e <sup>+</sup> is 7% of beam at 5 GeV/c, 50% at 2 GeV/c

**South Area (LEAR)** -- Design values for LEAR. The flux is for a long spill of  $10^9$  antiprotons every 1000 sec, with a 90% duty cycle in the final stage. The antiproton beam will be split into three branches.

Beam	Momentum range (GeV/c)	Flux (per sec)	Comments
External beam, with ultra-slow ejection from LEAR	0.3-0.6	$10^6$	Stage 1, Easter 83
	0.2-1.6		Stage 2, end 83
	0.1-2.0		Stage 3

**CERN SPS BEAMS** [Source: *Experiments at CERN in 1982*, D.R.O. Morrison (editor)]

**North Area Beams (NA experiments)**

Beam	Maximum momentum (GeV/c)	Maximum intensity for 10 <sup>12</sup> protons at 400 GeV/c	Beam type
H2	400	6 × 10 <sup>7</sup> π <sup>+</sup> at 200 GeV/c 2 × 10 <sup>7</sup> π <sup>-</sup> " " " 2.5 × 10 <sup>6</sup> e <sup>±</sup> at 150 " "	High energy hadrons or electrons (also enriched K <sup>+</sup> / $\bar{p}$ )
H4/E4	330	5 × 10 <sup>7</sup> π <sup>+</sup> at 200 GeV/c 1.5 × 10 <sup>7</sup> π <sup>-</sup> " " " 1.5 × 10 <sup>6</sup> e <sup>±</sup> at 150 " "	High energy hadrons or electrons (H4-test is an alternate test branch)
H6	200	6 × 10 <sup>7</sup> π <sup>+</sup> at 150 GeV/c 2.5 × 10 <sup>7</sup> π <sup>-</sup> " " "	Medium energy hadrons
H8	400	1.5 × 10 <sup>8</sup> π <sup>+</sup> at 200 GeV/c 5 × 10 <sup>7</sup> π <sup>-</sup> " " "	High energy hadrons (electrons)
M2	280	1.5 × 10 <sup>7</sup> μ <sup>+</sup> at 200 GeV/c 5 × 10 <sup>6</sup> μ <sup>-</sup> " " "	High intensity muons
P0	400/450	~10 <sup>13</sup> p at 400/450 GeV/c	High intensity primary protons for production of H10 or E12
H10	400/450	1.2 × 10 <sup>9</sup> π <sup>+</sup> at 200 GeV/c 4 × 10 <sup>8</sup> π <sup>-</sup> " " "	High energy high-intensity hadrons or protons
E12	300	1 × 10 <sup>8</sup> e <sup>-</sup> total with energy > 100 GeV	Broad-band electrons/photons

**West Area Beams (WA experiments)** The West Area beams are being modified to higher energies. The table below gives some calculated properties of the upgraded beams, which should be available from May 1983.

Beam	Maximum momentum (GeV/c)	Intensity for 10 <sup>12</sup> protons at 450 GeV/c	Beam type
H1	450	8 × 10 <sup>7</sup> π <sup>-</sup> at 200 GeV/c 2 × 10 <sup>8</sup> π <sup>+</sup> " " " 1.5 × 10 <sup>6</sup> e <sup>±</sup> " " "	Hadrons, electrons, or attenuated protons
H3	450	4 × 10 <sup>7</sup> π <sup>-</sup> at 200 GeV/c 1 × 10 <sup>8</sup> π <sup>+</sup> " " " 7 × 10 <sup>5</sup> e <sup>±</sup> " " "	Hadrons, electrons, or attenuated protons
X3	40*	10 <sup>3</sup> -10 <sup>4</sup> tertiaries/10 <sup>7</sup> incident H3 particles	Test beam; tertiary electrons + hadrons
X5	100**	10 <sup>3</sup> -10 <sup>4</sup> tertiaries/10 <sup>7</sup> incident H3 particles	Test beam; tertiary electrons + hadrons
X7	100***	10 <sup>3</sup> -10 <sup>4</sup> tertiaries/10 <sup>7</sup> incident H3 particles	Test beam; tertiary electrons + hadrons

\*X3 can also be run with the H3 optics, on high energy secondaries.

\*\*X5 can be run exceptionally at 300 GeV/c for calibration of the neutrino detectors.

\*\*\*X7 can be run exceptionally at 150 GeV/c to BEBC.

Extra power supplies and magnets have to be taken from other beams.

## CERN SPS BEAMS (continued)

**West Area Neutrino Beams** (WA experiments) -- Reference: CERN/EF/BEAM 80-7, A. Grant, High momentum version of the narrow-band neutrino beam N3.

Beam	Parent momentum (GeV/c)	Particle	Flux for $10^{13}$ incident protons <sup>†</sup>	$\langle E_\nu \rangle$ (GeV)	$\sigma_{\text{rms}}$ on $E_\nu$ (GeV)	Beam type
N1	450 protons	$\nu$	$5.3 \times 10^{10}/\text{m}^2$ ( $\sim 0.25$ ev/ton)	$\sim 30$		Wide-band spectrum up to 450 GeV
		$\bar{\nu}$	$2.3 \times 10^{10}/\text{m}^2$ ( $\sim 0.25$ ev/ton)	$\sim 30$		
N3	380 secondaries	$\nu_\pi$	$1.19 \times 10^7$	88	41	Narrow-band dichromatic beam with 450 GeV primary protons
		$\nu_K$	$5.4 \times 10^6$	259	49	
	350	$\bar{\nu}_\pi$	$1.4 \times 10^7$	82	37	
		$\bar{\nu}_K$	$1.7 \times 10^5$	248	48	
		$\nu_\pi$	$3.8 \times 10^7$	80	38	
		$\nu_K$	$2.5 \times 10^7$	251	45	
	320	$\bar{\nu}_\pi$	$3.2 \times 10^7$	78	35	
		$\bar{\nu}_K$	$7.2 \times 10^5$	224	49	
		$\nu_\pi$	$1.1 \times 10^8$	78	34	
		$\nu_K$	$8.5 \times 10^7$	228	45	
	300	$\bar{\nu}_\pi$	$5.3 \times 10^7$	74	32	
		$\bar{\nu}_K$	$1.7 \times 10^6$	220	37	
		$\nu_\pi$	$1.9 \times 10^8$	73	32	
		$\nu_K$	$1.2 \times 10^8$	220	41	
	275	$\bar{\nu}_\pi$	$1.1 \times 10^8$	68	29	
		$\bar{\nu}_K$	$3.4 \times 10^6$	215	34	
200	$\bar{\nu}_\pi$	$4.2 \times 10^8$	55	19		
	$\bar{\nu}_K$	$1.8 \times 10^7$	167	26		
	$\nu_\pi$	$1.0 \times 10^9$	54	20		
	$\nu_K$	$2.4 \times 10^8$	165	20		

<sup>†</sup> Fluxes for the N3 beam are at the WA1 (CDHS) detector in a circle of diameter 1.5 m.

**FERMILAB BEAMS** (Source: H.B. White, Jr., FNAL)

Currently, protons are accelerated to a maximum momentum of 500 GeV/c. The maximum intensity is  $3 \times 10^{13}$  protons per pulse, the repetition rate is 0.1/sec, and the beam spill time is 1 sec. With the commissioning of the *Energy Saver Project*, protons may be accelerated to momenta greater than 500 GeV/c. The intensity and repetition rate will be determined in practical operation. Maximum design momentum is 1000 GeV/c.

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle (mr)	Solid angle ( $\mu\text{sr}$ )	Particles	Flux in thousands per sec per $10^{12}$ protons on target	at (GeV/c)	Comments
*PW	1000 (peak)				p	$< 2 \times 10^{13}$		Primary proton transport to PW target
PW	20-250	7	0-8	8	$\pi^-$	$10^5$	200	P-west secondary beam
	20-300	5	0		$\bar{p}$	1000	100	P-west secondary beam
*PW	750 (peak)				$\pi^-$	$4 \times 10^6$	200	High intensity pion beam
					$\bar{p}$	$10^4$	175	P-west secondary beam
*PB	800 (peak)	15		4	$e^-$	$3 \times 10^4$	500	Wide band charged and neutral beam
PE	300 (peak)	2.3	0-2	1.2	$e^-$	$10^4$	200	Also provides tagged photons
	300 (peak)		0	0.04	n	4000	>100	Also tagged photons
PC	20-350				$\Sigma^-$	2000	300	P-center charged hyperons
					$\Omega^-$	<10	250	
ME(M1)	20-400	0.1-1.5	0-7	2	$\pi^-$	1000 (at 3.5mr)	200	Medium resolution beam
(M2)	20-400	0.1-1.4	0-1.5	0.2	p $\pi^-$	3000 (at 0.6mr) 300	200	Presently, diffracted protons available at 400 GeV/c with flux $< 3 \times 10^{12}$ per pulse
(M3)	300 (peak)		0.3-1.1	$\sim 10^-$	n	200/cm <sup>2</sup>	total	
(M4)	35-200	6	7-8	1	K <sup>-</sup> $\pi^-$	60 100	75	Presently a test beam
*ME	1000 (peak)				p	$< 5 \times 10^9$	1000	Primary protons
*MP	70-350	$0 \pm 5.0$	$0 \pm 1.0$		p	$10^5$	600	Polarized protons from 1000 GeV/c primary Antiprotons from 1000 GeV/c primary Also capable of unpolarized transport
	1000				$\bar{p}$ p and $\pi$	<7000	200	
*MC	100				K <sub>L</sub> <sup>0</sup> and n	$2 \times 10^5$	100	Neutral beam with 1000 GeV/c primary
*MB	200 (peak)				$\pi$ and K			Low intensity wide-angle test beam
*MT(M5)	100 (peak)				$\pi^\pm$ $e^\pm$			Low intensity wide-angle test beam to present multiparticle spectrometer

continued on next page

## FERMILAB BEAMS (continued)

Beam	Momentum range (GeV/c)	$\pm\Delta p/p$ (%)	Production angle (mr)	Solid angle ( $\mu\text{sr}$ )	Particles	Flux in thousands per sec per $10^{12}$ protons on target	$\rightarrow$ at (GeV/c)	Comments
*MW	1000 (peak)	10	$0 \pm 0.7$		p	$6 \times 10^6$	600	Beam transport to possible new multiparticle spectrometer; assumes 1000 GeV/c on target
					$\pi^+$	$5 \times 10^5$	600	
					$K^+$	$10^5$	600	
					$\pi^-$	$1.5 \times 10^5$	600	
					$K^-$	$10^4$	500	
					$\bar{p}$	$10^4$	300	
*MT	1000 (peak)	0.1	0		p	$10^5$	1000	Temporary beam to multiparticle spectrometer (will convert to test beam)
NW(N1)	50-275	2	0-1	4-16	$\mu^+$	150	225	To muon/hadron spectrometer, 400 GeV/c on target
	100-275				$\pi^+$	$>1000$		
*NW								Test beam
*NC	1000		0		p			Primary beam transport to center target
*NC-D	750 (peak)		0		$\nu/\bar{\nu}$	variable		Narrow band, sign-selected neutrino beam
*NC-T	1000 (peak)		0		$\nu/\bar{\nu}$	variable		Broad band, quadrupole focus
*NE	1000 (peak)		0		p	$\sim 10^7$	1000	To hybrid spectrometer system
*NT	500		0-3		hadrons	$\sim 10^4$	500	Test beam for neutrino detectors
*NP	1000		0		p	$\sim 10^{10}$	1000	Proton transport to prompt neutrino detector
*NM	275-750	20			$\mu^\pm$	$\sim 10^4$	750	Tevatron muon beam

\*These beams will be commissioned as part of the Tevatron II project. Design characteristics are shown; detailed characteristics will be determined in operation. These beams will also replace present beams in most cases.

**KEK BEAMS** (Source: A. Kusumegi, KEK)

Protons are accelerated to a maximum momentum of 13 GeV/c. The maximum intensity is  $4.0 \times 10^{12}$  protons per pulse. The repetition rate is 0.45/sec.

Beam	Momentum range (GeV/c)	$\pm\Delta p/p$ (%)	Production angle ( $^\circ$ )	Solid angle (msr)	Beam length (m)	Particles	Typical flux in particles per pulse	→ at (GeV/c)	Comments
EP1	4-13					p	$5 \times 10^{10}$		Fast extraction
EP2	4-13					p	$2 \times 10^{12}$		Slow extraction; branches feed the K2, K3, and $\pi$ - $\mu$ beams
$\pi$ 1	4-8	2	1.5	0.33	33	$\pi^+/\pi^-$	$2 \times 10^6/6 \times 10^5$	8	Under construction; fluxes estimated
$\pi$ 2	2-4.3	1	10	0.594	31.3	p/ $\bar{p}$ $\pi^+/\pi^-$	$10^4/10^2$ $2 \times 10^5/1 \times 10^5$	3	Internal target beam; fluxes for $10^{11}$ ppp
T1	0.5-2.3	2	23	0.16	18.8	$\pi^+/\pi^-$	$5 \times 10^4/4 \times 10^3$	1	Internal target beam; fluxes for $10^{11}$ ppp
T2	0.5-6.0	4	15	0.35	37.0	$\pi^+/\pi^-$	$10^4$	4	
K2	1-2	3	0	1.02	27.9	K $^+$ /K $^-$ p/ $\bar{p}$ $\pi^+/\pi^-$	$1.5 \times 10^5/5.7 \times 10^4$ $2 \times 10^7/1.2 \times 10^4$ $1.7 \times 10^7/1.4 \times 10^7$	2	
K3-S (K3-L)	0.5-1.0 "	2 "	0 "	7.3 (3.0)	14.4 (16.5)	K $^+$ /K $^-$ p/ $\bar{p}$ $\pi^+/\pi^-$	$4.2 \times 10^4/1.0 \times 10^4$ $7 \times 10^7/3.5 \times 10^2$ $5 \times 10^7/5 \times 10^7$	0.6 0.8 0.8	Fluxes are for the S (short) mode of operation
$\pi$ - $\mu$	0.1-0.45		87	20		$\pi^\pm$ $\mu^\pm$	$10^6$ $10^4$	0.15	

**LAMPF PARTICLE PHYSICS BEAMS** (Source: D. Dodder, Los Alamos)

The primary 800 MeV  $H^+$  beam normally runs with an average current up to 700  $\mu A$ , but 1.2 mA has been achieved. The macro duty factor is 6 to 9%, with a macrostructure of 120 pps with a maximum pulse length of 750  $\mu s$ . Each macropulse consists of a 0.25 ns burst every 5 ns. This beam is used to generate the meson and neutrino beams described below, as well as additional beams for other purposes. Simultaneously with the  $H^+$  beam a low current (5  $\mu A$  unpolarized; up to 25 nA polarized)  $H^-$  beam is accelerated to a desired energy between 212 and 800 MeV with a duty factor of 3 to 9%.

Beam	Momentum (MeV/c)	$\pm\Delta p/p$ (%)	Solid angle (msr)	Particle	Flux in particles/sec or current	$\rightarrow$ at (MeV/c)	Comments
A	1460	0.1		p	700 $\mu A$	1460	Main beam; 1.2 mA has been achieved
LEP	77-415	0.05-2.8	0-17	$\pi^+$	$7 \times 10^8$	195	Low energy pion beam; achromatic; flux at $\Delta p/p = 2.8\%$
				$\pi^-$	$\sim 2 \times 10^8$		
EPICS	156-415	2.0	3.4	$\pi^+$	$1.5 \times 10^8$	300	Energetic pion channel and spectrometer
				$\pi^-$	$3.3 \times 10^7$		
P <sup>3</sup>	100-750	5.0	7.0	$\pi^+$	$2 \times 10^9$	470	High energy pions; achromatic
	"			$\pi^-$	$3 \times 10^8$	470	
	28			$\mu^+$	$1.5 \times 10^6$	28	
	100			$\mu^-$	$0.8 \times 10^6$	100	
Stopped muon	25-250			$\mu^+$	$1.4 \times 10^8$	130	
	665-1460			p	5 $\mu A$	1460	Current reduced to 1/3 for <1460 MeV/c Polar. = 0.8 N,L,S available Polar. = 0.5; max $0^\circ$ is given; additional ports up to $37^\circ$ give lower energies "Unpolarized" beam has P = 0.2 at $20^\circ$
	"		$\bar{p}$	20 nA			
	<1460	0.8		$\bar{n}$	$10^4$		
	"	0.8		n	$10^7$		
External proton beam	665-1460	<0.1	<<6	p	<100 nA	1460	$H^-$ beam stripped to $H^0$ or $H^+$  Polar. = 0.8 available in N,L,S directions; independent of polarization direction of internal beam
	"			$H^0$	"		
	"			$H^-$	"		
	"			$\bar{p}$	10 nA		
	"			$\bar{H}^0$	"		
	"			$\bar{H}^-$	"		
Area C HRS	475-1460	0.26		p	2 $\mu A$		For high resolution proton spectrometer
				$\bar{p}$	10 nA		
Neutrino facility	0-53		$\sim 4\pi$ sr	$\nu_e$	$3 \times 10^{14}$	total	Peak momentum is 35 MeV/c for $\nu_\mu$ Flux at 8 m is $4 \times 10^8$ $\nu/cm^2\text{-sec}$ Source subtends $\pm 1.5^\circ$ for target 8 m away
				$\nu_\mu$	"		
				$\bar{\nu}_\mu$	"		



**SERPUKHOV BEAMS** (Source: Yu.G. Ryabov and V.V. Ezhela, Serpukhov)

Protons are accelerated to a maximum momentum of 70 GeV/c. The intensity is about  $3 \times 10^{12}$  protons per pulse. The repetition rate is 0.2/sec, and the beam spill time is about 2 sec.

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle (mr)	Solid angle ( $\mu\text{sr}$ )	Beam length (m)	Particles	Typical flux in particles per pulse	→ at (GeV/c)	Comments
2/14	30-70	1	6-35	10	120	hadrons+	$10^6$	60	Internal target lines
	30-60	1	0-5	30		hadrons -	$10^6$	60	2A, 2B, 14; the $e^-$ 's may be used for polarized $\gamma$ 's
	5-45	3	0-7	30		$e^-$	$10^6$	30	
4	20-50	1	0-5	40	130	hadrons -	$6 \times 10^6$	40	Internal target lines 4A, 4B, 4V, 4L, 4E
18	3-17	2	0-200	120	50	hadrons+	$10^8$	5	Internal target,
	2-14	2	240-400	80		hadrons -	$10^4$	8	injection in ring
20	0.4-3.2	1	0	2800	20	hadrons $\pm$	$10^8$	1	External target, fast ejection
19	70		0			p	$10^{12}$	70	Slow ejection
4N	$\leq 70$		12	1	40	neutrals	$10^7$	total	Internal target
7	30-70	0.25	11.5	1-4	511.5	p	$10^6$	69	Internal target, unseparated
	20-50	0.25	0	40		$\pi^+$ , $K^\pm$ , $\bar{p}$	5-10		Fast ejection, separated
	20-55	0.25	0	10		$\pi^-$	5-10		Fast ejection, unseparated
9	<25	0.5	0	30	194	$\pi^\pm$ , $K^\pm$ , $\bar{p}$ , d	5		Fast ejection, separated
	10-13	1	0	30		$\bar{d}$	0.8	12.2	Separated
8	<40 (mean=6)		0	2500	500	$\nu$ , $\bar{\nu}$	$5 \times 10^9$	total	Wide-band neutrino beam

**SIN BEAMS** (Source: SIN Users' Handbook, 1981)

The average energy of the primary proton beam is 589 MeV with a FWHM spread of 0.4 %. The pulse rate is  $5 \times 10^7$  per sec and the pulse width is 1 nsec. The maximum intensity at extraction is about 170  $\mu\text{A}$ .

**Pion Beams**

Beam	Energy range (MeV)	Minimum $\pm \Delta p/p$ (%)	Maximum flux (per sec)	for maximum flux		
				Energy (MeV)	$\pm \Delta p/p$ (%)	FWHM spot size H×V (cm)
$\pi\text{E1}$	50-350	0.2	$\pi^+$ $9 \times 10^9$ $\pi^-$ $8 \times 10^8$	225	2.5	$2 \times 5$
$\pi\text{E3}$	40-125	1.0	$\pi^+$ $7 \times 10^8$ $\pi^-$ $1.3 \times 10^8$	85	5.0	$5.6 \times 2.6$
$\pi\text{M3}$	50-350	0.1	$\pi^+$ $1 \times 10^8$ $\pi^-$ $9 \times 10^6$	225	3.0	$4 \times 2$
$\pi\text{M1}$	50-350	0.05	$\pi^+$ $3 \times 10^7$ $\pi^-$ $3 \times 10^6$	225	1.0	$0.9 \times 0.7$

**Muon Beams** ( $\mu^+$  fluxes are 4 or 5 times  $\mu^-$  fluxes)

Beam	Momentum (MeV/c)	$\mu^-$ flux (per sec)	$\Delta$ -range (g/cm)	Stop density $\mu^-$ (stops/g-sec)	$e^-/\mu^-$ ratio	Burst width (nsec)	FWHM spot size H×V (cm)
$\mu\text{E1}$	120-50	$3 \times 10^7$ - $4 \times 10^5$	4-0.3	$1 \times 10^5$ - $3 \times 10^4$	0.01-3	$\geq 4$	$6 \times 4$
$\mu\text{E2}$	125-50	$10^7$ - $10^5$	2-0.15	$4 \times 10^4$ - $1 \times 10^4$	0.01-3	$\geq 4$	$10 \times 6$
$\mu\text{E3}$	stopping			$3.5 \times 10^6$			
$\mu\text{E4}$	stopping			$2 \times 10^5$	$0.3(\pi^-/\mu^-)$		
$\pi\text{E3}$	28	$10^7(\mu^+)$	0.04	$2 \times 10^7(\mu^+)$	$0.1(e^+/\mu^+)$		$5 \times 4$

**Polarized Proton Beam** (pM1)

Mode of operation	Energy (MeV)	Polarization (%)	Flux (per sec)
Scattered from target M	590-225	38	$10^{10}$ - $3 \times 10^7$
Polarized ion source	590	80	$6 \times 10^{11}$

**Neutron Beam** (nE1)

Energy range (MeV)	Intensity in 25 cm <sup>2</sup> spot (per MeV-sec)	Available flight path (m)	Resolution from T.O.F. at 590 MeV (MeV)
590-200	$4 \times 10^5$ - $1.4 \times 10^5$	60	7

## SLAC BEAMS (Source: T. Fieguth, SLAC)

Accelerator mode	Particles	Momenta (GeV/c)	Particles per pulse	Pulse length ( $\mu$ s)	Repetition rate (Hz)	Comments
Normal	$e^-$	$\leq 23.5$	$\leq 5 \times 10^{11}$	1.6	$\leq 360$	To conserve power, repetition rates rarely exceed 180 Hz. The $e^+$ beam would require reinstallation of a high-power source.
	$e^+$	$\leq 15.0$	$\leq 2 \times 10^{10}$	1.6	$\leq 90$	
SLED	$e^-$	$\leq 33.5$	$10^{11}$	0.2	$\leq 360$	

Colliding beams	Particles	C.m. energy (GeV)	Peak luminosity ( $\text{cm}^{-2} \text{sec}^{-1}$ )	Average luminosity ( $\text{cm}^{-2} \text{sec}^{-1}$ )	Comments
SPEAR	$e^+e^-$	2-7.4	$2 \times 10^{31}$ at 6.4 GeV	$8 \times 10^{30}$	SPEAR has 2 interaction regions, PEP 6. At PEP, the luminosity scales as $E^{-2}$ ( $E^{-3}$ ) for c.m. energies below (above) that at the peak.
PEP	$e^+e^-$	8-36	$1.7 \times 10^{31}$ at 29 GeV	$8 \times 10^{30}$	

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle ( $^\circ$ )	Solid angle (msr)	Particles	Maximum particles per pulse	at (GeV/c)	Repetition rate (Hz)	Facility	Comments
21	1-16	$\leq 4.0$	1	0.03	$K^+/K^-$	17/8	10	$\leq 180$	LASS	Separated: $\pi/K \approx 1/30$ $\pi/\bar{p} \approx 1/14$
					$p/\bar{p}$ $\pi^+/\pi^-$ $e^-$ $e^+$	40/6 $10^3$ $10^4$ $10^4$	2.5			
27	20	9.0 FWHM	0	$10^{-7}$	$\gamma$	$10^2$	20	$\leq 20$	40' b.c. hybrid facility	Backscattered laser beam
3	$\leq 15$	0.1-1.0			$e^+$	$2 \times 10^{10}$	All	$\leq 90$	ESA 1.6, 8, & 20 GeV/c spectrometers	$e^+$ beam requires high power source; all fluxes at $\Delta p/p = \pm 0.25\%$ See footnote A
	$\leq 23.5$	0.1-1.0			$e^-$	$5 \times 10^{11}$	All	$\leq 360$		
	3.237 j (j=1,...,6)	0.1-1.0			$e^-$	$5 \times 10^{11}$		120, 180		
	3.237 j (j=1,...,6)	$\geq 0.5$			$e^-$	$10^9$		$\leq 360$		
	$\leq 21.5$ 5-15	Brems. 7-10	0 0		$\gamma$ $\gamma$	$4 \times 10^9$ EQ $5 \times 10^7$ EQ	20 All	$\leq 360$ $\leq 360$		
$\leq 21.5$	Brems.	0		$\gamma$	$2 \times 10^8$ EQ		$\leq 360$		See footnote D	
6	0.1-16	$\leq 2.0$	1.6-6	0.03	$e^-$	10		$\leq 60$	Test beam	
	1-16				$\pi^-$	10				
19	1-16	0.25	0		$e^+$	10	10	$\leq 60$	Test beam	Very pure; $\sigma_x = 1$ mm

- A. High intensity source; longitudinal polarization = 0.4  
 B. Low intensity source; longitudinal polarization = 0.85  
 C. Coherent bremsstrahlung, linearly polarized ( $10^9$  EQ without collimation)  
 D. Linearly polarized at maximum energy by coherent pair production in graphite

**TRIUMF BEAMS** [Source: Status of TRIUMF Plans for Development, G. Dutto, E.W. Blackmore, and M.K. Craddock, TRI-82-PP-37 (October 1982)]

The cyclotron energy range is 180-520 MeV with an energy spread of 0.1% (FWHM). The unpolarized intensity is 150  $\mu\text{A}$ , and the polarized intensity is 300 nA; the polarization is 75-82%. The BL4/BL1A split ratio is  $1/10^4$ . The phase width is variable from 0.5 to 6 ns. The pulse separation is 43 or 217 ns. There are plans to upgrade various performance levels.

#### Main beam lines

Beam	Particle	Energy (MeV)	Intensity	Momentum spread FWHM (%)	Polarization (%)	Spot size H×V(cm)
BL1A	p	180-520	120 $\mu\text{A}$ (500 MeV)	0.2	0	0.2×0.5
BL4/1B	$\bar{p}$	180-520	300 nA	0.2	70-80	0.2×0.5
BL4A	$\bar{n}$	160-500	$10^8/\text{sec}$	1.0	40-75	6×6
BL2C	p	65-100	10 $\mu\text{A}$	0.2	0	1×2

**Secondary lines** The M8, M9, and M20 fluxes are for full momentum acceptance with 100  $\mu\text{A}$  of protons on a 10-cm Be target. The M11, M13, and M15 fluxes are for full momentum acceptance with 100  $\mu\text{A}$  of protons on a 1-cm C target. Beams of  $\pi^-$  and  $\mu^-$  have the same properties as the  $\pi^+$  and  $\mu^+$  beams, except fluxes are about 5 times lower.

Beam	Particle	Momentum (MeV/c)	Particle flux (per sec)	→ at (MeV/c)	Momentum spread FWHM (%)	Polarization (%)	Spot size H×V(cm)
M8	$\pi^-$	0-220	$1.3 \times 10^8$	180	13	--	1×2
M9	$\mu^-$	30-150	$10^6$	77	14	50	8×8
	$\pi^+$	30-250	$2 \times 10^8$	120	14	--	10×2
M20	$\mu^+$	30-200	$2.5 \times 10^6$	30	5	>90	4×3
			$2 \times 10^6$	85	8	75	8×8
M13	$\pi^+$	30-130	$5 \times 10^7$	130	10	--	3×2
	$\mu^+$	30 (surface)	$1.3 \times 10^6$	30	10	>90	3×2
M11	$\pi^+$	90-470	$5 \times 10^6$	200	3	--	2×3
M15 (design)	$\mu^+$	30 (surface)	$1.6 \times 10^6$	30	12	>90	2×1

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