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BEVATRON OPERATION AND DEVELOPMENT. XXX, MAY THROUGH JULY 1961

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BEVATRON OPERATION AND DEVELOPMENT. XXX

May through July 1961

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BEVATRON OPERATION AND DEVELOPMENT. XXX
May through July 1961

Walter D. Hartsough

January 2, 1962

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University of California
Berkeley, California

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ABSTRACT

During this quarter the Bevatron operated 83% of the scheduled operating time. The machine was off 15% of the scheduled operating time because of component failure and 2% at the request of the user. A total of 1947 hours of experimental time was accumulated by five Laboratory physics groups engaged in primary experiments. Eighteen target bombardments were made for the Chemistry Department.

BEVATRON OPERATION AND DEVELOPMENT. XXX
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OPERATION

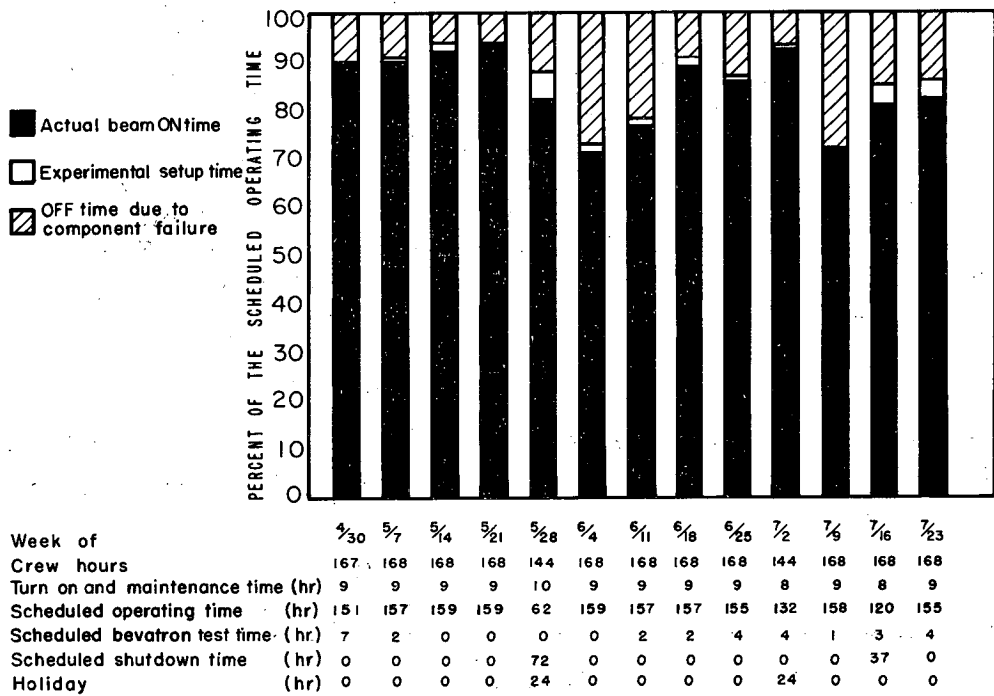
Bevatron operation is summarized in Fig. 1 and Tables I and II. The Bevatron was shut down on May 30 and July 4 for holidays. Shutdowns for experimental setup change and maintenance occurred twice: May 31 to June 3, and July 17 to 19.

RESEARCH

The experimental program accomplished during the period January through April 1961 is summarized in Table III. Table IV lists the experiments done this quarter.

MAGNET POWER SUPPLY

The magnet pulse record appears in Table V.



MU-25463

Fig. 1. Bevatron operating schedule, May through July 1961.

Table I. Beam record.

Week of (1961)	Number of 8-hour shifts	Total integrated beam (10^{15} protons)
April 30 — May 6	21	16.3
May 7 — 21	21	15.1 ^a
May 14 — 13	21	15.9
May 21 — 27	21	17.9
May 28 — June 3	8	5.0
June 4 — 10	21	11.0
June 11 — 17	21	11.0
June 18 — 24	21	14.2
June 25 — July 1	21	12.0
July 2 — 8	18	11.8
July 9 — 15	21	8.1
July 16 — 22	16	8.2
July 23 — 29	20	14.0
Maximum beam amplitude at full energy = 3.2×10^{11} protons per pulse		
Maximum injected beam = 625 μ a		
Average beam per 8-hour shift = 6.3×10^{14} protons		

^a During a portion of this week, at the request of the user, the machine was run at reduced beam levels.

Table II. Analysis of the total lost beam time due to component failure (%)

Month (1961)	Injector	Magnet power supply	rf Accelerating system	Other
May	27	26	13	34
June	18	39	14	29
July	49	16	29	6

Table III. Summary of Bevatron experimental research program, January through April 1961.

Group	Start of experiment	End of experiment	Experiment	Beam time		Pulse schedule	Primary or secondary experiment
				(12-hour periods)	(hours)		
<u>Internal Groups</u>							
Alvarez	4-22-60	in progress	π^+ interactions in hydrogen and deuterium, using the 72-inch hydrogen bubble chamber (0.9 to 1.6 Bev/c).	268 50	2732 548	1:1 1:2	P
Alvarez	8-9-60	1-24-61	K^- interactions in hydrogen and deuterium, using the 15-inch hydrogen bubble chamber (740 Mev/c).	119 34	1279 330	1:1 1:2	P
Lofgren	12-7-60	1-31-61	K^+ - p and K^+ - n total cross sections and elastic scattering (1 to 3 Bev/c).	22 10	248 106	1:1 1:1	P S
Lofgren	1-27-61	1-31-61	π^+ - p scattering, measurement of angular distribution (1.5, 2.0, and 2.5 Bev/c).	3	25	1:1	S
Segrè	2-5-61	in progress	π^- - π scattering (280-Mev/c to 2.25-Bev/c π^-).	55	475	1:1	P
Barkas	3-9-61	3-15-61	Emulsion exposure (740-Mev/c K^-).	10	87	1:1	P
Lofgren	3-16-61	4-23-61	Spark chamber tests in a π -meson beam.	—	14	1:1	S
Lofgren	4-21-61	in progress	Study of Σ , Λ decay polarization, using spark chambers (1-Bev/c π^+).	5	69	1:1	P
Perlman	Chemistry target bombardments (4) in the internal proton beam.						

Table III. (continued)

Group	Start of experiment	End of experiment	Experiment	Beam time		Primary or secondary experiment
				(12-hour periods)	(hours)	
<u>External Groups</u>						
Institution and Experiment						
Univ. Chicago Northwestern U. Levi-Setti	1-14-61	1-23-61	Emulsion exposure (800-Mev/c K ⁻). Study of production of hyper-fragments.	9	106	1:1 P
Duke Univ. Block	1-27-61	4-10-61	K ⁻ interactions in a helium bubble chamber (740 Mev/c).	65 ^a	636 ^a	1:1 P
U. Tennessee King	3-16-61	3-16-61	Emulsion exposure (740-Mev/c K ⁻).	—	1-1/2	1:1 P
U. Stockholm Ekspong	4-12-61	4-13-61	Emulsion exposure (700-Mev/c K ⁻).	2	30	1:1 P
Univ. Miami Perlmutter	4-13-61	4-15-61	Emulsion exposure (700-Mev/c K ⁻).	1	14	1:1 P
Tufts Univ. Schneps	4-15-61	4-15-61	Emulsion exposure (700-Mev/c K ⁻).	2	18	1:1 P
Oxford Univ. Wilkinson	4-16-61	4-20-61	Emulsion exposure (700-Mev/c K ⁻).	9	88	1:1 P

^aThis experiment was done on a 1:1 and 1:2 pulse basis. The beam-time record, however, represents the equivalent of 1:1 pulse operation.

Table IV. Summary of Bevatron experimental research program, May through July 1961.

Group	Start of experiment	End of experiment	Experiment	Beam time		Primary or secondary experiment	
				(12-hour periods)	(hours) schedule		
<u>Internal Groups</u>							
Alvarez	4-22-60	6-11-61	π^+ interactions in hydrogen and deuterium, using the 72-inch hydrogen bubble chamber (0.9 to 1.6 Bev/c).	304 50	3096 548	1:1 1:2	P
Segrè	2-5-61	5-28-61	$\pi - \pi$ scattering (280-Mev/c to 2.25-Bev/c π^+).	83	769	1:1	P
Lofgren	4-21-61	6-10-61	Study of Σ, Λ decay polarization, using spark chambers (1-Bev/c π^+).	38 4	459	1:1	P S
Crowe	6-4-61	7-17-61	K_e, K_{μ_3} decay spectra (700-Mev/c K^+).	38	426 129	1:1 1:1	P S
Powell	6-10-61	in progress	Study of $\Lambda^0, \Sigma^+, \Sigma^-$ leptonic decay, using the 30-inch propane bubble chamber (700 Mev/c K^-).	33	345	1:1	P
Alvarez	6-11-61	in progress	Study of RBE spill on targets. Preliminary studies for a future experiment.	—	9	1:1	P
Lofgren	7-10-61	7-13-61	Test of a hydrogen Cerenkov counter.	—	30	1:1	S
Segrè	7-21-61	in progress	$\pi - \pi$ scattering (continuation of run listed above).	11	119	1:1	P
Perlman	Chemistry target bombardments (18) in the internal proton beam.						
<u>External Groups</u>							
Institution							
U. Washington	7-19-61	7-31-61	Test of a hydrogen Cerenkov counter.	5	50	1:1	S

Table V. Bevatron motor-generator set monthly fault report.

MONTH	10 to 17 pulses per minute												Totals			
	4 to 6 pulses per minute			7 to 9 pulses per minute			10 to 17 pulses per minute			Totals			P/F Ignitrons replaced			
	Pulses	Faults	1500 to 9000 amp	Pulses	Faults	7000 to 9000 amp	Pulses	Faults	1500 to 6900 amp	Pulses	Faults	7000 to 9000 amp		Pulses (P)	Arc-backs	Total (F)
(1961)																
Jan.	2001	--	1200	--	--	5099	--	--	6671	--	--	277091	59	24	35	4951
Feb.	--	--	--	--	--	--	--	4431	345853	--	--	345853	45	9	36	45
Mar.	--	--	--	--	--	--	--	3981	396827	--	--	396827	51	10	41	7857
April	--	--	--	--	--	--	--	4364	398449	--	--	402813	55	20	35	55
May	--	--	--	--	--	--	--	2752	416350	--	--	419102	61	16	45	6870
June	--	--	--	--	--	--	--	9781	343112	--	--	343112	38	7	31	38
July	--	--	--	--	--	--	--	3891	373182	--	--	373182	41	11	30	41

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Edward J. Lofgren is the Bevatron Group Leader; William A. Wenzel is the Alternate Group Leader. Walter D. Hartsough, with Glen R. Lambertson and Wendell Olson assisting, is in charge of Bevatron operation. The operating crew supervisors are Duward Cagle, Frank Correll, Ross Nemetz, and Glenn White. The following are crew members: Robert W. Allison, G. Stanley Boyle, Robert Brokloff, Ashton Brown, Norris Cash, Ferdinand Dagenais, Raleigh Ellisen, Robert Gisser, William Kendall, William Lee, Wayne Logan, David Loucks, Kenneth Morgan, and Joseph Smith. Many support and development projects were carried out by crew members. In addition, the following were responsible for special projects: Robert Anderson, Trancuilo Canton, Warren Chupp, Bruce Cork, Kenneth Crebbin, Rudin Johnson, Leroy Kerth, Glen Lambertson, Fred Lothrop, Robert Richter, William Wenzel, Emery Zajec, and Theodore Zipf. Engineering groups were headed by Edward Hartwig, Electrical Engineering; Clarence Harris, Electrical Coordination; and William Salsig, Mechanical Engineering. Donald Milberger was in charge of the Electrical Maintenance Group.

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