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Journal

AIP Conference Proceedings, 1381(1)

ISSN

0094-243X

ISBN

9780735409415

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Publication Date

2011-09-22

DOI

10.1063/1.3635821

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The first (almost) half century of the TEXAS Symposia

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Abstract. The Texas Symposia on Relativistic Astrophysics had their origins in a couple of astounding scientific discoveries and a demographic accident. A sequence of additional discoveries over the next 15 or so years (pulsars, X-ray binaries, the microwave background, gamma ray bursts....) perpetuated the series, while the inventory of topics thought appropriate for discussion first expanded and then contracted down to a now fairly rigid set, which is easily discerned from the titles of the rest of the papers in these proceedings, while the past inventory has included complex molecules, large telescopes, and at least a few planets. We explore here portions of what happened from 1st Texas in Dallas in December 1963 to the 25th gathering in Heidelberg in 2010, including the parade of "hot" topics, some demographic and scientometric developments, and a few probably authentic anecdotes. Changes in the sources of funding, nationalities of speakers and participants, and gender balance reflect (sometimes with considerable time delay) the larger landscape of science over the years.

I. INTRODUCTION: BEFORE THE BEGINNING

Cygnus A came first. An accurate radio position measured by Graham Smith (1951) led quickly to optical identification by Baade and Minkowski (1954). The story of their bet about whether they were seeing two galaxies in collision near the middle of a distant cluster or something else belongs to another history. The point here is that the distance, and even more that of a radio galaxy at $z = 0.461$, implied truly enormous energy supplies to keep the synchrotron radiation shining. Saying that the synchrotron electrons were secondary to relativistic protons (Burbidge & Hoyle 1956) raised the ante by about a factor of one hundred, and soon fell afoul of gamma ray limits; again another story. This is the context in which Hoyle & Fowler (1963) proposed that the underlying energy source was gravitational collapse of some very massive objects, the first of our two causative scientific events.

Then, in spring 1963, came the announcement of QSRSs (Quasi-Stellar Radio Sources) by Maarten Schmidt (1963) and others (C. Hazard et al. 1963), the second scientific event. The demographic item was the recognition by four then-young relativists that they were rather isolated in Texas, where the weather in winter was considerably more clement than in Princeton and other places where relativists were concentrated. A count of home addresses for the 1963 participants (in the Proceedings, Robinson, Schild, and Schucking 1965) suggests some such possible motivation for 96 of the 291 people.

25th Texas Symposium on Relativistic Astrophysics
AIP Conf. Proc. 1381, 5-18 (2011); doi: 10.1063/1.3635821
© 2011 American Institute of Physics 978-0-7354-0941-5/\$30.00

The founders were:

- *Ivor Robinson*, b. 7 October 1923, Liverpool, BA Cambridge, at Univ. College Wales (1950-58), North Carolina, Syracuse, Cornell (1958-63), to Univ. Texas Dallas, 1963
- *Alfred Schild*, b. 7 September 1921, Istanbul; schooling in Austria, to UK 1939, interned and sent to Canada (like Bondi & Gold), BA Toronto 1943, MS 1944, PhD 1946, Carnegie Inst. Tech. (1946-56), to U. Texas Austin 1957 to create the Center for Relativity Theory, d. 24 May 1977.
- *Engelbert L. Schücking*, Dipl. Math, Göttingen & Hamburg 1950, 1955, to U. Texas Austin 1963; currently at NYU.
- *Peter G. Bergmann*, b. 1915, Berlin, Berlin Gymnasium, to Prague 1933, with Einstein & Bargmann at Princeton 1936-41, with US Navy WWII, to Syracuse 1947; at Yeshiva in 1963; back to Syracuse, d. 19 October 2002.

November, 1963 saw the assassination of US President Kennedy in Dallas, and apparently some thought was given to cancelling the meeting (not mentioned in the Proceedings), but the symposium went ahead. The December, 1963 meeting of the American Astronomical Society in Washington, BC also occurred as scheduled, and must have been rather somber.

II. THE FIRST TEXAS SYMPOSIUM

In June, 1963, the four founders sent out a number of invitations that began by describing some of the problems presented by extra-galactic radio sources, gravitational collapse of a superstar, and the brightness and variability of 3C273B. They suggested that it would be necessary to bring experts from many fields together and suggested that a late 1963 conference in Dallas might be well timed. A public announcement appeared in *Nature* (200, 317) describing "an international symposium on gravitational collapse and other topics in relativistic astrophysics" with Ivor Robinson as the contact person. Notice the implication that the meeting would be open to all who wished to attend, at least as listeners, if not as speakers. At a time when IAU Symposia and General Assemblies and the triennial General Relativity and Gravitation symposia were by personal invitation only, this was a very attractive feature, which I checked out by simply signing on for the 1967 version, without asking anybody's permission.

The participants at First Texas included people from at least nine industrial organizations, many of which were sponsors, both Tinsleys, both Burbidges, and "Dr. and Mrs. de Vaucouleurs." The proceedings cost \$10. John A. Wheeler and his Princeton colleagues produced an independent volume on relativity and some of its implications and applications that was much less widely distributed. In addition to the industrial sponsors' representatives (Sect. V), there were multiple participants from Ling-Temco-Vought, Texas Instruments, The RAND Corporation, Socony Mobil Oil. Co, Lockheed, and Boeing.

- How many of the 291 registrants were women? Ten, alphabetically and with nationalities: Erika Böhm-Vitense (Germany/US and mislisted as V.E. Böhm),

TABLE 1. Summary of the Symposia so far. Abbreviations: "NP"=No proceedings published, "*" I was there and have notes.

NUMBER	YEAR	LOCATION	Notes
1	1963	Dallas, Texas	
2	1964	Austin, Texas	
3	1967	New York	January, NP, *
4	1968	Dallas, Texas	NP, *
5	1970	Austin, Texas	NP, *
6	1972	New York, NY	*, First in Proc. NY Acad. Sci.
7	1974	Dallas, Texas	*
8	1976	Boston, MA	*
9	1978	Munich, DE	
10	1980	Baltimore, MD	*
11	1982	Austin, Texas	*
12	1984	Jerusalem	*
13	1986	Chicago, IL	*
14	1988	Dallas, Texas	*
15	1990	Brighton, UK	*, Also ESO-CERN
16	1992	Berkeley, CA	*, Also PASCOS
17	1994	Munich, DE	Invited for workshop summary
18	1996	Chicago, IL	Contribution refused
19	1998	Paris, France	
20	2000	Austin, Texas	
21	2002	Florence, IT	*
22	2004	Stanford, CA	
23	2006	Melbourne, AU	
24	2008	Vancouver, BC	*, NP
25	2010	Heidelberg, DE	*
26	2012	Sao Paolo, BR	Planned
27	2013	Dallas, Texas	Planned, 50th anniversary
28	2015	Geneva, Switz.	Planned

Eleanor Margaret Peachey Burbidge (UK/US), Yvonne Choquet-Bruhat (France), S. Mavrides (France), Paris Pishmish de Recillas (Turkey/Mexico), Vera Cooper Rubin (US), Elizabeth L. Scott (US), Susan Simkin (US), Beatrice Muriel Hill Tinsley (UK/NZ/US), Antoinette de Vaucouleurs (France/US).

- The countries represented were US, UK, Australia, France, Canada, Switzerland, India, Japan, West Germany, Finland, Italy, Norway, Hungary, Mexico, Israel, Argentina, Belgium, and Tunisia. By the 13th Texas in Chicago, the number of countries was rather similar, but not entirely the same ones: US, UK, Australia, France, Canada, Switzerland, India, Japan, West Germany, Netherlands, Israel, Denmark, South Korea, and Sweden.
- This is perhaps as good a place as any to note that my sources have included published proceedings for all symposia where they exist (Table 1); Maran and

Cameron (1967, 1969 on the 3rd and 4th symposium, the proceedings of the third having disappeared in some problem at Gordon & Breach - yeah, I'm still scared of Martin Gordon); Hajicek (1971) on the fifth; and my own notes, taken at a rate of about six pages per hour, at the Symposia I attended (Table 1). A discussion of the first 25 years, with more original references, was prepared for a Festschrift that was never published. A poorly edited version appears as Trimble (1992). The editor was a non-scientist who had just arrived from Argentina.

III. SCIENTIFIC AND ANECDOTAL HIGHLIGHTS

Hong-Yee Chiu, whose chapter on gravitational collapse begins the proceedings of First Texas (Robinson, Schild, & Schucking 1965, Univ. Chicago Press), took one look at the acronym QSRS (quasi-stellar radio source) and coined the word quasar. This was slow to catch on, largely because Chandrasekhar (then editor of the *Astrophysical Journal*) declined to print it, thinking it was not well defined. He changed his mind when Maarten Schmidt provided a short, clear definition (compact optical emission including strong emission lines indicative of large redshift), and a few symposia into the series, "quasar" is being used indifferently for both radio loud and radio quiet sources, though my ear still twitches at "radio-quiet quasars."

Another name that took a while to settle down is that for what, at various times, was called the 3-degree, thermal, microwave, black body, relict, background, cosmic, isotropic radiation, now universally the CMB (cosmic microwave background).

Table 2 is an attempt at a reasonably complete, unprejudiced list of the topics that were new and/or seen to be exciting and important at each of the first 16 Symposia. Many subjects – quasars themselves, pulsars, X-ray and gamma-ray sources – have always been part of the inventory. Others were in, then out, and came back only recently (gravitational radiation, extragalactic gamma ray bursts, Kaluza-Klein, Hawking radiation). Still others are gone and arguably best forgotten (Cf²⁵⁴ for supernovae, the Dicke oblate sun, Christmas tree models for AGNs, non-cosmological and preferred redshifts like 1.95, and the mixmaster universe).

And then there are the stories participants bring back, not all of which appear in the proceedings, listed by year. These are not unbiased!

1963 had three summary talks, by Peter Bergmann, Rudolph Minkowski, and Philip Morrison, all of whom recognized that at that stage only weak-field general relativity was needed. Tom Gold's after dinner talk went beyond this to express hope that the relativists would not be thrown back out of astrophysics and also evokes nostalgia for the era when Texas was nearly dry, and one carried a brown bag containing a small bottle of scotch into one's favorite club.

1964 reflected the effort to establish an annual conference, abandoned in favor of biennial up until the present (but both 2012 and 2013 are currently on the schedule).

1967 was my first Texas. I was so naive that I didn't even tell my advisor I planned to go, and paid all expenses from my grandmother's birthday and Christmas checks. How much? Well, there was no registration fee because there were so many sponsors. The airfare was about \$230 (and more for participants who did not stay over Saturday night). Rooms at the Hotel New Yorker were \$9 per night. But one group dinner has reminded me ever since to think twice about how to include graduate students in meals with visiting speakers etc. Greenstein, speaking about gravitational redshifts of white dwarfs, mentioned my contribution to the work, which he probably would not have if I hadn't been there. One outcome was George Gamow sketching me as "The Red Shift Girl" (the garment was actually a swirl of red and black). This was, of course, the first Texas after the discovery of the CMB, and Gamow (chairing a panel discussion of it) mumbled, "Well, I lost a nickel, and you found a nickel. Who's to say it's the same nickel?" One of his early predictions for the CMB temperature had been 5 K, and the mumble might have meant that he still wasn't sure about the whole thing.

1968 was the time when Tom Gold suggested that Bob Dicke and Joe Weber should repeat each others' experiments. Neither was amused, I heard later. (A visiting assistant professor at Smith College that year, I had not yet met either.)

1970 had a little cluster of us from the Institute of Theoretical Astronomy in Cambridge who were generally to be found gathered around Steve Hawking's wheel chair on one side of the room. He had been able to walk with a cane until shortly before this.

1972 marked the last appearance of gravitational radiation on a Texas program until 2002 in Florence. I gave the talk for which Weber had been invited, perhaps in the hope it would defuse increasingly violent opposition. This didn't work, and I also gave no other Texas talks until 2002.

1974 had a review of gamma ray burst models given by Mal Ruderman, in which one of his overheads contained a list of theorists who had not put forward a GRB model. There was one name (Jerry Qstriker). Ruderman also laid claim to a previously unclaimed model - comets hitting white holes. Tom Gold popped up several times, once to worry that applied, directed research was driving out pure, curiosity-driven research. (What would he think now). His after dinner talk included the "turtles all the way down" story, a fine quote from the Emperor of Austria, Franz Josef (Ich werde darüber nachdenken lassen), and the suggestion that S. Jocelyn Bell-Burnell, co-discoverer of pulsars, should be asked to give that talk in 1976.

1976 indeed included Jocelyn's talk. She had, by then, been asked to deliver such remarks many times, and began by saying that there comes a time when you remember not what happened but how you told the story last time. This is profoundly true. Garbed in a very elegant dinner dress, cut to fit precisely without belts, hoses, or other accouterments, she remarked acerbically about the "male chauvenist pig microphone, intended to be clipped to a gentleman's tie" with the broadcasting bit inserted in a gentleman's jacket pocket. I have been careful to bring a jacket with lapels and pocket to every conference since.

1978 was the first "Texas in Europe" and the first with a woman proceedings editor (Judith Perry). The after dinner speaker was Walter Sullivan, superb as you might imagine.

1980 had the first Texas conference tote bag (which held up much less well than the Baltimore IAU royal blue one).

1982 was the first Texas with a poster session; **1984** in Jerusalem was the smallest so far, but we got to meet the Mayor of Jerusalem.

1986 had the first Texas T-shirt (these have since disappeared from most meetings).

1988 was the meeting where Howard Greyber finally got to give his talk on strong magnetic field models for AGNs, which he had been pushing at least since 1963. Engelbert Schücking (1989), in the introductory talk, pointed out what a remarkable achievement a 25th anniversary was for something that met every two years. Ivor Robinson's after-dinner story about returning home after a long absence (1986 was back in Dallas) feels, in retrospect, a little culturally insensitive for retelling here (ask me at the 26th!).

1990 had Hoyle giving the after dinner talk, with Roger Tayler in the chair, and an evening public lecture (an increasingly common feature of Texeri and other large conferences) by Hawking.

1992 included a significant scientific "oops," a talk in which Saul Permuter reported $q_0 = 0.5$, based on observations of the light curve of one moderately distant supernova. Supernovae are now, of course, regarded as among the most important items of evidence for an accelerating cosmic expansion (negative q_0).

2002 was my first talk at a Texas Symposium in 30 years. Something I said about supernovae or their remnants prompted the remark from a female participant near the back of the room, "that is controversial." Now controversial can signify either "we who are expert on the problem are working on it and will get back to you when we have the answer," or "my opponent is full of bananas." She clearly meant more nearly the latter, so my response was, "Believe me, you don't know what 'controversial' means unless you've been married to Joe Weber for 28 years."

2008 was the occasion when I presented much of this material as an introductory historical talk (but no proceedings were published). Everyone was asked to stand; and I then requested those who were attending their first Texas to sit down; then those for whom 2006 in Melbourne was the first; then 2004 in Stanford; and so forth back to 1967 in New York (by the time I had only two companions still on our feet); and 1964 in Austin took us all down. No one who had been in Dallas in 1963 was there; nor, I believe, were any in Heidelberg, though a good many of the 300 are still living

TABLE 2. Hot Topics and Scientific Highlights

Year	Subject
1963	QSRSs (quasar name marginal), radio galaxies, optical identifications; gravitational collapse beyond Oppenheimer-Volkoff limit not necessarily inside horizon; importance of GR; enormous energies if cosmological distances, central object growth by accretion; possibility of new physics.
1964	Largest expansion of topics from previous meeting. Particle physics; X, gamma, ν astrophysics, cosmic rays, supernovae; technical GR; Haro-Luyten objects; QSOs (new, much more numerous than QSRSs); optical and radio data on QSOs, QSRSs, radio galaxies; models of all these; galaxies and clusters - X-rays, evolution; optical ID of Sco X-1; phantom gamma ray sources.
1967	3K background radiation (panel chaired by Gamov; Shklovsky coined "relict radiation"); Cosmic rays = galactic (Ginzburg) vs. extragalactic (GR Burbidge); Big Bang nucleo-synthesis; WD redshifts (Greenstein); Dicke (oblate) sun & Brans-Dicke gravity; Star cluster models of QSOs (Colgate, Gold); Log N - log S (Scheuer for Ryle); optical IDs of Sco X-1, Cyg X-2 ("nova-like" = accretion on NS).
1968	Pulsars (110+ in real publications by 12/68; more in IAUCs, preprints); solar neutrino limit = small; Weber events = large; ISM molecules (not just for CMB).
1970	Black and white holes; anti-matter symmetry; UV from OAO II: theory and observations of gravitational radiation.
1972	X-ray binaries; accretion disks & Cyg X-1 as black hole; superluminal motions; Hawking black holes & thermodynamics; first deuterated molecule; Chapman & Ingersoll (spherical sun) vs Dicke (oblate sun); increasing doubts about Weber events as gravitational radiation.
1974	First binary pulsar & GR tests; GRBs data & VERY many models; supernovae; potential of X-ray polarization for XRBs (Rees); Dicke = faculae (Hill & Stebbins; rediscovered 2008). First parallel sessions.
1976	X ray bursters; direct B measurement in Her X-1 (Trümper), Cos B data; computational GR (Smarr); Rubin-Ford effect; DM in spirals (also Rubin & Ford); X-ray trees for QSOs; galactic evolution and Λ (Rubin, Salpeter, Rees, Tinsley); nothing on GRBs or gravitational radiation.
1978	QSO absorption lines; PeV/TeV AGNs; time derivative of PSR 1913+16 (Taylor); X-ray bursts = thermonuclear (Joss) \neq GRBs; Arp non-cosmological redshifts (last time); Large scale distribution of galaxies (Peebles); galaxy formation = gravitational instabilities (Fall); gravitational radiation confined to parallel session (Amaldi).
1980	First Einstein data; first gravitationally lensed quasar; SS 433; 5 March 1979 GRB =different!; very large scale structure & deviations from Hubble flow; galaxy formation with explosions or neutrinos; SN II = gravitational collapse: SN I = thermonuclear; galactic center maybe = black hole (Oort); AGNs include Seyferts, radio galaxies, QSOs, QSRSs, etc.

TABLE 2 – continued from previous page

Year	Subject
1982	particle physics & cosmology; cosmological nucleosynthesis; first msec psr; new inflation (Guth); pancakes as VLSS; future large telescopes: Texas = HET eventually; TMT = Keck eventually; honeycombs = Gemini eventually (Harlan Smith, J. Nelson, Angel).
1984	IRAS first data; HST & AXAF pre-launch; CMB still isotropic at 5×10^{-4} ; strings; supernovae; CVs; inflation; AGN unification based on mass, accretion rate, and orientation.
1986	New detector technology for telescopes; soft gamma repeaters (new class); GRBs still = NS surfaces; supergravity, superstrings; cold dark matter.
1988	SN 1987A; LMXRBs evolving to binary psr = statistical problem; great observatories =GRO, HST, AXAF, SIRTf (advertisements); solar neutrinos: Kamioka confirmation that direction = sun and MSW perhaps relevant; small BH at galactic center (Ramaty, Lingenfelter, Ozernoy vs. Oort big BH); core topics of early universe, general relativity, AGNs, dark matter, VLSS, pulsars (esp. 1957+20, black widow), XRBs settling down.
1990	First Texas for COBE data, ROSAT data, SAGE data. GRBs still local NS; neutron stars; QSO record $z = 4.94$; galaxy = 3.8; particle astrophysics, no gravitational radiation.
1992	pulsar with planets (radio, real, vs. false alarm in 1991); SAGE/GALLEX data in; GRBs= cosmological (Paczynski), 50-50 cosmological vs. local (Rees in concluding remarks); HST with flaw finds BH in nearby normal galaxies; MACHO, OGLE, EROS preliminary data on microlensing by hypothetical DM entities in MW halo (not most of DM); IMBH test; COBE only in contributed talks though major papers appeared in 1992 ApJL (anisotropies, perfect black body spectrum).
1994	This table stops here, partly because we are in the regime of current events rather than history, and partly because I did not attend 1994 and 1998 (in Europe, during Maryland semesters), 1996 (beginning to walk; with difficulty; JW was there), and 2000 (JW had just died).

IV. HOW BIG IS RELATIVISTIC ASTROPHYSICS?

Since Robinson appears to have invented the phrase in 1963, by definition there were no people and no papers belonging to the field before that. As for what has happened since, we can track "Texas" participant numbers some of the time, fractions of all published papers and of *Annual Reviews* papers on the subject for some other times, and membership in organizations like the High Energy Astrophysics Commission of the IAU and the High Energy Astrophysics Division of AAS at a few still different times.

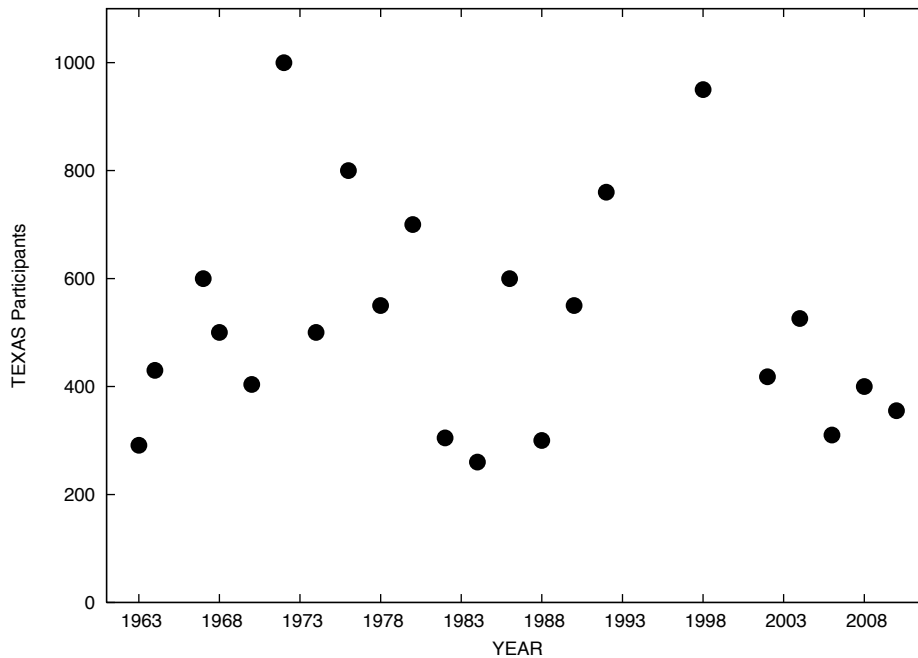


FIGURE 1. Approximate numbers of participants at most of the Texas Symposia. Uncertainties are probably about as large as the circles. Numbers have come from proceedings, lists of registrants distributed at the meetings, and, for a couple from asking the organizers. Such lists of participants in proceedings and lists of registrants at meetings are very useful for other purposes as well, but don't always exist.

Figure 1 is Texas participation. Fewer than 300 in 1963 became more than 400 in 1964, about 600 in 1967, with a peak of very nearly 1000 in 1972, never yet quite equaled since, though nearly so in Paris in 1998. The minimum was not many more than 200 in Jerusalem in 1984, though the Austin and Dallas meetings on either side were not enormously larger, and the last two meetings have hovered around 400, we think, while Brazil organizers are planning for 500-600.

Does this mean that the field is dying or at best holding steady? No, it means that there are now enormous numbers of more specialized meetings, on millisecond pulsars, QSO absorption lines, and dozens of other topics that are also part of relativistic astrophysics.

Other indicators yield a rapid rise and then a very steady percentage of the community and the papers, while the total sizes of astronomical literature and the communities of scientists who contribute to it continue to grow at some rapid rate that we hesitate to describe as exponential (an unlucky Malthusian concept).

A couple of specific examples: The fraction of *Annual Reviews of Astronomy and Astrophysics* on traditional Texas topics began at about 12% for the 1963-67 quinquennium; was 22% for 1967-71; peaked at 35% for 1971-75; and has held steady at very close to 24% throughout the 1990s and down to the present. The fraction of all papers is trickier to assess, but, according to *Astronomy and Astrophysics Abstracts*, traditional Texas topics appear in 12% of 1279 papers for 1969 and 24.4% of 2705 papers in the second half of 1989. Closer to the present, Trimble and Ceja (2005) report 25% of 11,829 observational papers primarily devoted to "Texas" topics in 2001-2003 and another 10%

or so to cosmological issues. The percentages for 2008 of 4479 papers (again observational and a somewhat smaller set of journals, Trimble & Ceja 2010) are 24% for relativistic astrophysics and about 9% for cosmology. The fractions of AAS members who belong to the High Energy Astrophysics Division and of IAU members who belong to the Commission on High Energy Astrophysics have also been fairly steady (but considerably smaller than the paper fractions) for decades, while the total memberships of these organizations have grown enormously.

V. INTERNATIONAL RELATIONS; MEN, WOMEN, AND MONEY; AND OTHER DEMOGRAPHIC TOPICS

The Symposia have, from time to time, been rather unlucky in interfacing with international problems. The first round of invitations for 1963 included ones addressed to the three leaders of Soviet astrophysics and cosmology: Vitaly Lazarevich Ginzburg, Iosif Samuilevich Shklovsky, and Yakov Borisevich Zel'dovich. None of them received passports to attend, and the only Soviet physicist present was Yakov Terletsky, who had been in the US for other reasons, does not seem to have been an outstanding theorist, but was widely thought of as a party member. Shklovsky and Ginzburg made it to the 3rd and 4th Symposia, but then lost the "third cosmic velocity" for many years, turning up again only in the 1980s and 1990s. The phrase was Zeldovich's description of what was required to cross the Atlantic (the first and second cosmic velocities took one to Eastern Europe and West of the Oder-Neisse line). He never attended any Texas Symposia, and was in the US only once, rather briefly to speak at the US National Academy, not long before his death (yet another story).

There were, once again, no Soviet/Russian participants at the 1984 Texas in Jerusalem (and had been no Israeli physicists at a GRG in Moscow before). Leonid Ozernoy had submitted a poster, which somehow got there and was displayed while he, back in Moscow, was fasting in protest over not receiving a visa to come to Israel.

A distinguished Chinese cosmologist, Fang Li-Zhi, was invited to the 1988 meeting in Dallas. By the time of the symposium, he had taken refuge in the US embassy in Beijing. He arrived in Brighton successfully in time for the 1990 Texas, and was just then a UK resident (eventually settling in the US). One of his early contributions to the series was to remark to Ivor Robinson that there were no Chinese scientists on the international organizing committee, which immediately resulted in his appointment to it.

Upon hearing the story, I immediately remarked that there were no women either, and I have been a sporadic member of the IOC ever since. This is a slightly less vacuous position than it sounds. Apart from token support by the International Union of Pure and Applied Physics in recent years, the Texas Symposia have never had any sponsoring organization or society. The series is self-perpetuating, and since Robinson ceased to chair the IOC, the SOC chair from Symposium N has automatically become the IOC chair for N+1.

These points about "first woman on the IOC" and self-perpetuation lead inevitably to the topics presented in fairly gory detail in **Table 3**. The left column is the year of each symposium; next come listings for the numbers of women vs. total numbers for the IOC

and/or SOC and the plenary speakers with, for small but non-zero numbers, some names and topics. The right hand column is a listing of the organizations thanked for support either as money or in kind. Industrial organizations appear and then disappear, and the narrowing of US government agencies contributing reflects the Mansfield Amendment, in which Congress declared that US defense money could not be spent for pure science. The Texas symposia were placed in this forbidden category, despite Gold having pointed out that the relativistic correction to the path of a guided missile is several Angstroms. One suspects that there are contexts where it might be more, given that the modern GPS system has to include GR effects. Probably the gender and financial information exists for all the symposia; I simply didn't find it.

Abbreviations that may need decoding include AFOSR = Air Force Office of Scientific Research; ONR = Office of Naval Research; AEC = Atomic Energy Commission; AS&E = American Science and Engineering (founded by X-ray astronomers); TRW = Thompson-Ramo-Wooldridge; MPG= Max Planck Gesellschaft; MPI = Max Planck Institute; DOE = Dept. of Energy; and the rest you are expected to know! Notice that science publishers constitute a relatively recent category of sponsor here and at other meetings. The idea is that they set up displays of recent relevant books and journals and either take orders or, sometimes sell them on the spot at the end of the meeting.

TABLE 3. MEN, WOMEN, AND MONEY

YEAR	IOC, SOC	SOURCES OF FUNDING
	Plenary Speakers Women, total	
1963	0/4 0/37	SW Center for Advanced Studies, U Tx, Yeshiva, Aerospace Research Lab. AFOSR, NSF, Wright-Paterson Air Force Base
1964	0/7 0/63	???
1967	0/4 0/33	APS, AAS, ONR, NSF, AEC, NASA, Carnegie Inst. Wash., GE Space Science Lab, Motorola (maker of Quasar TV)
1968	0/6 0/26	SW Center, U Tx, AAS, ONR, AFOSR, NSF, AEC, IBM, Kaiser Aerospace, General Dynamics
1970	??? 0/17+	NSF, AEC, IBM, AAS, APS
1972	0/16 2/40*	AS&E, Boston U, Gravity Res. Found., NSF, NY Academy of Science, NYU, IBM, U Tx Austin & Dallas (*talks: N. Bahcall on Her X-1, VT)
1974	0/20 2/55*	AS&E, Boston U, IBM, Merle Collins Found., NSF, TRW, U Tx (*talks: N. Bahcall, X-ray Clusters; BM Tinsley, galactic evolution)
1976	0/19 4/53*	Boston U, Brandeis, Grav. Res. Found., Harvard, IBM, MIT, NASA, NSF, NY Acad Sci, U Tx (*talks: A Cowley, XRBs; Koch, Cos B; Rubin; Tinsley, galaxies)

TABLE 3 – continued from previous page

YEAR	Women, total	SOURCES OF FUNDING
1978	0/18 2/38*	MPG, Deutsche Forschungsgemeinschaft, MPI, Bavarian Gov. (*talks: EM Burbidge, C. Cesarsky)
1980	0/21 1/16*	JHU, Martin Marietta, NASA, NSF, U. Maryland (*talk: Weistrop, AGN Workshop summary)
1982	0/20, 0/7 2/27*	NASA, NSF, Winnie Schild, Harlan Smith, Tracor Ind., DoE, U Tx Austin, Steven Weinberg, John Wheeler (*talks: Faber, MH Ulrich)
1984	0/26 2/22*	NSF, Israel Min. of Sci. & Dev., Hebrew U, Technion, Tel Aviv U Weizmann Inst, surplus from previous Tx symposia, Y. Ne'eman (*talks: Geller, N. Bahcall)
1986	0/17, 1/30* 6/125**	DoE, FNAL, NASA, NSF, Northwestern U, U Chicago (*SOC: VT; **talks: nearly all contributed)
1988	0/19, 2/33* 3/64**	NASA, NSF, Texas Acad. Sci, U Tx Dallas, Arco (*SOC: NB, VT; **talks: LA Willson, JP Vader, A Harding)
1990	0/19, 2/33* 0/23	CERN, ESO, ICSC (Trieste), London Math Soc, RAS, RS, NSF, NASA, NY Acad Sci, U Tx Dallas (*SOC: NB, VT)
1992	1/32 3/34*	UCB Cent. Part. Ap, DoE, NASA, FNAL, NSF, LBL, LLNL, NY Acad Sci, SSC, SLAC (*talks: A Kinney, HST; J Hewett, lensing; H Quinn, part. physics)
1998	1/31* 2/33**	CEA-Saclay, CNRS, CNES, IUPAP, ESO, ESA, NASA (*SOC: Cesarsky; **talks: Ruiz-Lapuente, Vangioni-Flam)
2002	4/19* 3/37**	INAF, INFN, CNR (*SOC: Olinto, Rubin, CC, VT; **talks: Olinto, Grenier, VT)
2008	1/28* 4/20**	UBC, SFU, Cand. Inst. Adv. Res, CITA/ICAT, IUPAP, Sheraton Vancouver, PiTP, Perimeter Institute (*SOC: VT; **talks: W Freedman, VT, M Campanelli, I Stairs)
2010	6/37, 5/28 7/24	MPG, MPI Kernphysik, German Federal Ministry for Education and Research (BMBF), IUPAP, Springer, Struck Innovative Systeme, Cambridge UP

What is one to make of the participation of women as organizers and speakers? Since we meet to discuss science and not to mate, one-to-one parity is not to be expected. Indeed a past president of sponsoring organization IUPAP looked at a recent line-up of the Astrophysics Commission (C19) and said "Too many women" (mispronounced, which made it worse). There were, in fact, 7 out of 15, which had arisen from my chairing the Commission 2002-05 and being asked on short notice to identify colleagues

from several small countries who would help out. Naturally I thought of women (just as men asked for candidates usually think of other men). A plus was that, when the next chair was unexpectedly too ill to serve, I had two good buddies as vice chair and secretary to keep C19 going as a trium-fem-ate. None the less, given that women now make up 15-35% of various astronomical communities (varying with country and generation) and crossed the 10% line long ago, one might argue that Texas has been slow.

It remains true that participation by Chinese and Japanese scientists is very modest (one Chinese colleague on the IOC/SOC, one Japanese speaker on neutrinos has been typical). A meeting in South America (the first there) will probably not change this, but some day, perhaps. At least in comparison with the IAU and IUPAP, India is another greatly under-represented country.

Texas has been to Israel once (which the IAU and IUPAP have rigorously avoided, even when there is an invitation, as there was for an IAU Symposium for 2011), and, with careful regard to political correctness, let me note that all four Texas founders were born on the east side of the Atlantic of Jewish parentage and were part of the enormous pre-, peri-, and post WW II diaspora. This was, of course, true of a considerable fraction of the US theoretical physics community in general. I haven't looked at the total speaker lists, but of the small number of women involved early in the SOC, IOC, or plenary talks, five are Jewish (N. Bahcall, VT, Vera Rubin, Donna Weistrop, Margaret Geller). So too, of course, were Shklovsky, Ginzberg, and Zeldovich.

ACKNOWLEDGEMENTS

I first compiled some Texas Symposium history for an invited talk at a session of the American Physical Society marking the 75th anniversary of general relativity at the invitation of Kenneth Brecher and Clifford Will. The next iteration was written for a Festschrift honoring Indian historian of science Dr. I.N. Sengupta which was never published. I updated it for a contributed talk at the 1996 Symposium, which was refused by the organizers, and then again for the 2008 Texas in Vancouver. Steve Maran and P. Hajicek generously provided copies of their reports of the 3rd, 4th, and 5th Symposia for which no proceedings were published. My participation in Texas Symposia has generally been supported by the US Internal Revenue Service via a Schedule A deduction.

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