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TEXAS SYMPOSIUM WILL OPEN WITH SESSION ON PULSARS -- BUT KEEP UP WITH NEWEST IDEAS ON QUASARS, TOO

DALLAS --

Five years ago, the word "quasar" came out of a Dallas scientific meeting. It evolved as a short name for some nearly-unbelievable sky objects; powerful centers of energy, comparing to three trillion suns, that seemed to be billions of light years from Earth and speeding away further at 30,000 miles a second.

This year, the new word is likely to be "pulsar." It will not originate in Dallas; but some of the world's best in radio astronomy, cosmology, and relativity will be here in mid-December to voice their observations and theories about the newest puzzlers of the universe.

The Southwest Center for Advanced Studies will be local host to the Fourth Texas Symposium on Relativistic Astrophysics. The international meeting returns here, to its 1963 starting point, after making a not-quite-annual circuit to The University of Texas at Austin, and to New York City, where the Belfer Graduate School of Science, Yeshiva University, was host for the third "Texas" meeting.

Organizers of the 1968 meeting, including Profs. Ivor Robinson and Istvan Ozsvath of the SCAS Mathematics and Mathematical Physics Division, will get together for a third planning session in New York City, May 19-22. They'll also trade notes on pulsars, at a conference on "rapidly pulsing radio sources" to be held at the Goddard Institute for Space Studies.

The opening session of the Dallas meeting, next Dec. 16, will swing into the subject of pulsars immediately after Stanley Marcus welcomes the international visitors.

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The preliminary program lists Martin Ryle of Mullard Radio Observatory, Cambridge, England, and Andrzej Trautman of Warsaw University, Poland, as session chairmen for the day. Professor Trautman has previously visited Dallas, as a faculty member of the Center, during two summers.

Anthony Hewish of Mullard Observatory and Frank Drake of Cornell University's Observatory (which operates the world's largest radio telescope near Arecibo, Puerto Rico under contract to the Air Force) will report first on radio observations of the pulsars.

There may be new data by December; there will probably be new ideas about pulsars. First concepts of the quasi-stellar objects, which were re-named quasars, have been much-altered since the 1963 meeting here.

As their story stands today, there are four pulsars: Pulsating Radio Sources One, Two, Three, and Four.

Three of the radio signal sources "send" in bursts of three pulses. The three pips are about 12 milliseconds (thousandths of a second) apart, and last from 30 to 40 milliseconds. One pulsar signal is a single pip that comes along every 0.253 seconds. The timing of the triplet signals is very precise; they arrive each 1.337, 1.273, and 1.187 seconds.

Science fiction writers are already at work on the idea that the signals, which vary in strength from pulse to pulse, could be a code used by a civilization as advanced as our own in an attempt to reach others.

The pulsars so far seem to be concentrated in a corner of our galaxy (the Milky Way, including our Sun and its planets among many billions).

Three pulsars are very close to the plane of the Milky Way, which has the shape of a cookie about 10 times as long as it is thick. These seem to be about 300 light years away, although Doctor Drake says the distance could be one-half or twice that.

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Pulsating Radio Source Three is the single signal transmitter, and a closer neighbor at 100 light years. But it is at nearly 60 degrees' incline from the plane of our galaxy.

The pulsars have diameters about the size of the Earth, if the sizes of their radio "beams" match their physical measurements. Again, PRS-THREE is the exception. It seems to be about one-third the diameter of the Earth.

Along with this general idea of size, the pulsar puzzle includes a big item: Pulsar signals (if they were produced by radio transmitters designed by Earth people) would require power output that totals 10 billion times more than the power production of all our world's generating systems.

Even with allowances for advanced technology and engineering tricks far beyond ours, in a far reach of the galaxy, this seems much too high to be plausible, says Doctor Drake.

So, he doubts that someone out there is trying to reach us (or other worlds); or, that the signals are part of an interstellar navigation system for very advanced astronauts.

If the signals were actually produced by electronic devices, Earth engineers would find fault with the design on two points: Pulsar signals are broad in frequency, not sharply tuned; and they are at low frequencies, where the whole background radio noise of the Milky Way tries to mask them.

So, on the idea that nature's own power sources are being tuned in by radio telescopes, what <u>are</u> pulsars?

Could the radio bursts be from a neutron star? This is something no astronomer has ever seen, because it is (or could be) a burned-out Sun that has collapsed to a fantastic density. One cubic inch of its material could weigh more than 100 million tons.

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But the theory and mathematics that say neutron stars are possible won't let them pulsate at such rapid rates as PRS-ONE through FOUR.

Unless, that is, the neutron star happens to be spinning rapidly, about once a second. This idea has come from both Thomas Gold of Cornell and Kip Thorne of California Institute of Technology; both will be on a panel here, Dec. 16, to discuss pulsar theory.

Herbert Friedman of the Naval Research Laboratory, Washington, D. C., whose research has centered on X-ray sources among the stars, will also be here as a session chairman in that field.

On the subject of pulsars, Doctor Friedman has said that a white dwarf star and a more normal one, spinning around each other, might produce the signals. He readily admits he doesn't know how the combination would form; but, he says, no one has a truly satisfactory explanation of binary star formations of any type, and they do exist.

Allen Sandage, of Mt. Wilson and Palomar Observatories in California, is also on the program in the Dec. 19 session on cosmology. Before he comes here, his observation team will take aim on PRS-ONE with the 200-inch Hale telescope for at least two nights. They'll try to find out whether there is any pulsation in visible light.

Their method will be like fishing for minnows in a busy trout pool. They will have to concentrate on a count of about 500 photons per second from PRS-ONE, while the sky itself is producing a "noise" of 4,000 counts per second.

The quasars, on which 1963 discussions here centered, will not be forgotten in December. Maarten Schmidt of CalTech, who reported some of the early quasar observations then, will bring new reports for the programs of Dec. 20, as the meeting closes.

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