☆ STAR DUST

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ROSE TO ADDRESS NCA ON STATUS OF PULSAR PHYSICS

DR. ROSE

Present views on the generation of magnetic fields in pulsar interiors and the production of electromagnetic radiation by relativistic particle streaming along these fields will be reviewed at the November 2 meeting of the National Capital Astronomers.

Dr. William Rose, an associate professor in the Department of Physics and Astronomy of the University of Maryland, will lecture.

Pulsars are known to be rotating neutron stars. From the observed rate of decrease in the rotation period one can infer that they have very strong magnetic fields — of the order of 10^{12} Gauss. Dr. Rose will describe the likely mechanism by which such fields are formed and their role in the pulsed radio emission which characterizes these objects. He will include a discussion of recent attempts to explain the origin of X-ray pulses from the Crab pulsar, NP 0532, and the production of relativistic particles in the Crab Nebula, M1.

After receiving his Ph. D. in physics from Columbia University in 1963, Dr. Rose joined the Department of Astrophysical Sciences at Princeton University. From 1967 to 1971 he was an associate professor in the Physics Department of M.I.T. Since then, he has been an associate professor in the Department of Physics and Astronomy of the University of Maryland. His research has included the application of masers to radio astronomy (1959-1963), balloon astronomy (1963-1966), and theoretical astrophysics (1966 to the present).

NOVEMBER CALENDAR — *The public is welcome.*

Friday, November 1, 8, 15, 22, 29, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, November 2, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations unnecessary.

Saturday, November 2, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. William Rose speaks.

Monday, November 4, 11, 18, 25, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue at McKinley Street, NW. Information: Jerry Schnall, 362-8872.

OCTOBER LECTURE

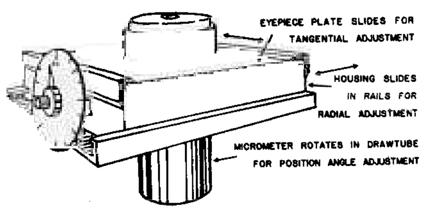
The enigmatic magnetic field of Mercury, as revealed by the first spacecraft to measure it, was discussed by Norman F. Ness at the October 5 meeting of National Capital Astronomers

Until Mariner 10 passed close to Mercury on March 29 and September 21, 1974, a significant general magnetic field of the planet was regarded as quite improbable because of the slow planetary rotation; radar measurements had determined the period to be 59.5 days. In March, however, Mariner 10 measured a magnetic field extrapolated to have a strength between 100 and 2, 000 gammas at Mercury's surface. For comparison, the Earth's magnetic field has a surface strength of 30, 000 to 60, 000 gammas.

It is likely that Mercury's magnetic field is intrinsic, and dominated by a dipole approximation as is the Earth's. An external, induced field surrounding the planet cannot be ruled out by current data, however. If internal, Mercury's magnetic field is probably a remnant of a stronger field developed during hypothetical ancient, fast-rotation days, or is an implanted fossil field. The large range of magnetic field strength on Mercury is apparently due to large differences in location of the rotational and magnetic poles. Further, the dipole axis may not be centered in the planet, which would result in the magnetic poles being less than 180° apart.

That Mercury has such a magnetic field with its slow rotation is sure to spur scientist pointed out that Mercury's interior must be far more active than thought previously. A lively question period followed his talk.

A FILAR-SCREW MICROMETER FOR SMALL TELESCOPES

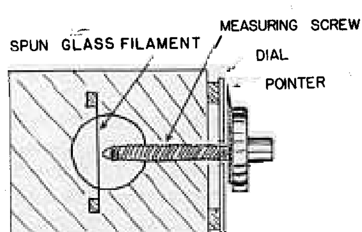


The Schubert filar-screw micrometer

Wolfgang Schubert has built a simple, lightweight micrometer for solar prominence measurements with his H_α monochromator. Of the construction and use of the device Wolfgang writes:

"Due to the considerable success I've had photographing solar prominences with my solar prominence telescope (*Star Dust*, April and June 1973, March 74), I thought it would be interesting to get some idea of their dimensions. To this end, I had previously constructed a grid which I superimposed on prominence negatives in my enlarger. This worked well, but lacked immediacy of measurement results. A filar micrometer seemed the next thing to consider.

"To have one stationary wire is simple enough, but to have a second wire moving while remaining parallel is a complication I prefer to avoid. I devised a way to build a micrometer simply and lightly. The case is made of balsawood; the reference wire is a very thin, single filament of spun glass carefully cemented across two wooden blocks as illustrated. It is only somewhat flexible, and will break if bent sharply. I broke several before I succeeded in laying one straight across without getting any dust motes stuck to it.

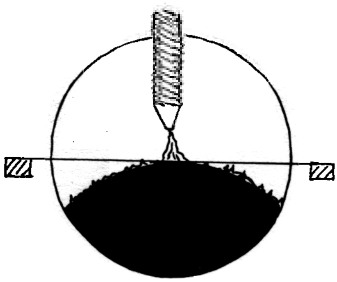


Filar-screw assembly

"The measuring screw is a 1½-inch long 8-32 zinc-plated machine screw. Because one nut threaded onto this screw would result in an intolerable amount of play, I used three nuts, well spaced, to absorb the slack; I haven't been able to detect any residual play.

A 42,000-mile-high loop prominence measured and photographed in H_α light by Wolfgang Schubert.

"As the sketch shows, the screw is tapered almost to a point. About ½mm is left flat — as accurately flat as possible. The nylon ring of which the pointer is a part is a friction fit on the shank of the screw. When the filament is replaced, the pointer can be re-zeroed with the screw tip just touching the filament. If the replacement filament should be cemented on the blocks a bit off true, the pointer adjustment can thus compensate this error.



Proper setting for measurement

"In use, the micrometer is adjusted so that the reference wire is precisely tangent to the solar limb at the base of the prominence. The screw is then turned in until the tip just touches the top of the prominence. The height of the prominence is then read directly from the dial."

Each turn of Schubert's dial advances his measurement screw 1/32 inch. The focal length of his telescope is 62½ inches — just 2, 000 times as far. Since the Sun is approximately 93 million miles from the Earth, we can round off the distance to 100 million miles with only a 7 percent error. Divide the Earth-Sun distance by 2, 000 to find the distance on the Sun represented by one turn of the measurement screw — approximately 50, 000 miles.

Schubert checked the calibration of his scale by measuring some known objects. Of this, he continues:

"Since there are no constant features on the Sun to serve as a basis for calibration, I resorted to lunar craters for this purpose. Although the Sun's diameter could be used, its 864, 000 miles exceeds the field of my instrument.

"I selected lunar craters as close to the center of the observed disc as possible to avoid crater ellipticity. I used craters with as wide a range of sizes as possible to calibrate a large portion of the micrometer dial. Some of those selected were, Kepler, 22 miles in diameter; Arzachel, 50 mi; Ptolemaeus, 90 mi; Clavius, 145 mi. These distances were multiplied by 400 — the ratio of solar to lunar distances."

Balsawood is light, strong, easy to work, and particularly suitable for many accessories for small telescopes. Schubert has exploited its features both ingeniously and artistically in the construction of numerous devices, several of which we hope he will describe for us in the future.

EXCERPTS FROM THE IAU CIRCULARS

1. September 11 — C. T. Kowal, Hale Observatories, discovered an object believed to be a satellite of Jupiter with the 122-cm Palomar Schmidt. The 20th-magnitude object was 1 west and 0.5 south of Jupiter. Photographs have also been obtained with the 229-cm Steward Observatory reflector on Kitt Peak. The orbit of the object is not yet definitive, but calculations by Aksnes and Marsden suggest that it is a member of the "middle" satellite group having direct orbits.

2. October — Taylor and Hulse, University of Massachusetts, working at the Aricibo Observatory, discovered a binary pulsar in Sagitta. The pulsation period of 0.059 second varies with a period of 0.3230 day.

3. October 6 — Yoshiyuki Kuwano, Hita, Oita, Japan, discovered a 9th-magnitude object in Sagittarius ($17^h\ 45^m.7$, $-18°\ 45'$) believed to be a nova. This observation has been confirmed by Simmons, Sweetsir, and Sherrod.

4. October — Precise observations of the position of 433 Eros indicate that the predicted path of its occultation of κ Geminorum will be shifted eastward. On October 25.15 Eros will make a close approach to SAO 025467, magnitude 6.6. The separation is predicted by G. E. Taylor to be 23" as seen from the center of the Earth, 13" as seen from the north pole.

This listing courtesy R. N. Bolster.

RADIO ASTRONOMERS SHARE NOBEL PHYSICS AWARD

The 1974 Nobel Prize in physics has been awarded to two radio astronomers, Martin Ryle, for development of the aperture-synthesis technique, and Antony Hewish, for the discovery of pulsars. The award was announced in Stockholm on October 15.

STAR DUST

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