

to the planet. Acuna and Hess (*Nature*, 253, 327, 1975) have reported on the preliminary analysis of the data and they conclude that Jupiter's main magnetic field is not dipolar, but is nearer to an octupole.

The field measurements were carried out by a high field magnetometer whose range extended upto 17 gauss. The Pioneer 11 field measurements point out that the offset tilted dipole (OTD) model based on radio Astronomical and Pioneer 10 measurements do not represent the observed data. Higher harmonic multipoles are needed to explain the observed distribution of the magnetic field.

A comparison of the expected field distribution from the OTD model and the actual field observation show a good agreement for distances greater than  $3 R_j$ . Closer to the planet, the magnetic field increases

more rapidly than the inverse cube law for a dipole implying the existence of higher order multipoles.

Based on the field distribution for the octupole model and the consequent behaviour of particles with asymmetrical mirror points, the authors conclude that the source of decametric radio emission from Jupiter is the sporadic precipitation of particles in the Jovian auroral regions. This model also is consistent with the 10 hour periodicity (Jupiter's rotation period) in charged particle observations made by Pioneer 10. Because of the azimuthally asymmetric magnetospheric configuration, a particular field geometry occurs only once every Jovian rotation rather than twice, as is true for nearly axial symmetry (such as an OTD with small offset).

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## FIFTH SEMINAR ON GENERAL RELATIVITY AND GRAVITATION

The fifth seminar conducted by the Indian Association for General Relativity and Gravitation was held at the Indian Institute of Technology, Powai, Bombay, between December 27-29, 1974, concurrently with the Fortieth Annual Conference of the Indian Mathematical Society. The seminar was inaugurated by Professor V. V. Narlikar, who outlined some of the highlights of the developments of general relativity with historical anecdotes. Professor P. C. Vaidya, President of the Association, spoke about electromagnetic waves with shearing rays in the context of special relativity. He was followed by Professor A. K. Raychaudhuri from Presidency College, Calcutta, who discussed cosmology within the Einstein Cartan framework and the problem of preventing gravitational collapse when magnetic fields are present. In the evening, Professor J. V. Narlikar gave a general talk (common to GRG-5 and the Indian Mathematical Society) on gravitational implosions and explosions in which he described some of the recent work on black and white holes.

On the second day, Professor Nagaraj from Bangalore University discussed the problem of creation of massive scalar fields and the geometry of the underlying space-time. Dr. Eric Lord outlined a generalization of Einstein's gravitation theory, which is conformally invariant by introducing two scalar fields, leading to two gauges (the Einstein gauge and the atomic gauge)

with the help of which he could account for Dirac's large-number hypothesis. Dr. S. M. Chitre spoke about equilibrium structures of dense matter in which general relativity played a prominent part.

Apart from these invited lectures, there were about 30 contributed talks on subjects like exact solutions of Einstein Maxwell equations, gravitational wave solutions, gravitational collapse problems, central redshifts of massive objects, white hole ejection of high energy particles, relativistic magnetofluids, etc.

One highlight of the seminar was a panel discussion on relevant problems of General Relativity and Gravitation. The speakers emphasized the need to tackle either physically realistic problems or problems which yielded new and elegant mathematical techniques.

Nearly 70 participants attended the seminar. The next seminar (GRG-6) will be held at Bose Institute, Calcutta, in the following year. It was also decided to organize a summer or winter school on problems of GRG.

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### OBITUARY

We regret to announce the sudden demise of Shri R. S. Srikantan,  
Secretary of the Madras Astronomical Association, on January 18, 1975.