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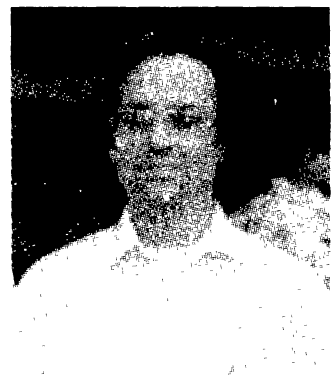
A Tribute



Bhaskar Datta

Renowned astrophysicist Prof. Bhaskar Datta passed away in Bangalore on December 3rd, 1999 after a brave battle with cancer. He was 50. In his career spanning more than 25 years he worked extensively in the area of High-energy astrophysics, Astro-particle physics, General relativity and Cosmology. In particular, he specialized in the structure and properties of neutron stars.

Prof. Datta was born and educated in Delhi. After obtaining his Master's degree in Physics from the Delhi University he worked in NORDITA, Copenhagen as a Guest Physicist. The following year he moved to the NASA Goddard Institute of Space Studies, New York, where he worked with Prof. V. Canuto for his Ph.D. thesis. He obtained his Ph.D. from City University of New York in 1977 for his work on spin-2 interaction in a relativistic neutron gas. He derived an equation of state of matter at high density using this interaction and demonstrated its effect on the derived masses and moments of inertia of neutron stars. Many years later he and his colleagues were to derive yet another Equation of State for neutron star matter, based on the chiral sigma model that includes a dynamically generated isoscalar vector field.

Prof. Datta returned to India in 1978 after brief stays at University of Florida and International Centre for Theoretical Physics, Trieste, Italy. From 1978 to 1982 he worked at the Tata Institute of Fundamental Research, Mumbai. In 1982 he moved to the Indian Institute of Astrophysics, Bangalore where he worked until his death. He also held the position of an adjunct professorship at the Raman Research Institute, Bangalore.

Prof. Datta's move to Bangalore coincided with the discovery of the fastest spinning neutron star known, namely the millisecond pulsar PSR 1937+21. By then already a recognised expert on neutron star structure, he plunged headlong into computing the structure with fast rotation. He, with his colleague Alak Ray, showed that the millisecond pulsar could be spinning close to the rotational instability, and its very existence poses important constraints on the mass, moment of inertia and equation of state of neutron star matter. This work of his was hailed as one of the most significant contributions to neutron star physics at that time.

In this early work on fast rotating neutron stars the rotation was included in the general relativistic equations in an approximate way, through the Hartle-Thorne prescription. The perfectionist in him was not happy with this and he constantly sought to improve this model. Finally in the last few years techniques were developed to treat rotation in an exact manner within general relativity, and he was quick to adopt these techniques in his stellar models. This paid rich dividends — he was able to refine constraints on the masses of spinning neutron stars using the recently discovered Kilohertz quasi-periodic oscillations in low-mass X-ray binaries. He was also able to calculate the effect of neutron star rotation on the boundary layer luminosity in accretion disks of X-ray binaries. He had started work on a whole host of related problems, but unfortunately passed away before seeing them to completion. This work is now being carried on by his students and collaborators.

One of his most notable contributions was the 1988 review article on neutron star structure in the journal Fundamentals of Cosmic Physics. This lucid and informative article became a standard text and reference for many of us working in related areas.

Of late Prof. Datta had also become keenly interested in the existence, structure and properties of stars made of quarks. Some of his nuclear physics work over the years had addressed the possibility of phase transition to quark matter in dense neutron stars. In the last one year or so he had been investigating possible pairing interactions in quark matter, and also the conversion of neutron stars to quark stars. One of his latest papers, published posthumously, shows that the energy released in this conversion process would be sufficient to power a gamma-ray burst.

Apart from his work on compact stars, Prof. Datta also made several important contributions to the areas of Cosmology and Astro-particle physics. These include the derivation of bounds on some cosmologically important mass and energy scales, providing insights into the origin of light elements and suggesting a method to detect the formation of quark plasma in accelerator experiments involving collisions of heavy ions.

Prof. Datta was a Fellow of the Indian Academy of Sciences and a member of the International Astronomical Union.

He was one of the friendliest persons I have known and a thorough gentleman. His zest for life, and his positive outlook even under most trying circumstances were exemplary. Not surprisingly, he had wide-ranging research collaborations with scientists all over the country and abroad. To those of us who collaborated with him, it was a privilege and an unforgettable experience.

His untimely death leaves a void that will be very hard to fill.

Dipankar Bhattacharya