Indian Institute of Astrophysics

भारतीय खगोलभौतिकी संस्थान

IIA COLLOQUIUM

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A challenge to the standard cosmological model

In the ΛCDM cosmological model the Universe is assumed to be isotropic and homogeneous when averaged on large scales. That the Cosmic Microwave Background has a dipole anisotropy is interpreted as due to our peculiar (non-Hubble) motion because of local inhomogeneity. There must then be a corresponding dipole in the sky distribution of sources at high redshift. Using catalogues of radio sources and quasars we find that this expectation is rejected at >5σ, i.e. the distribution of distant matter is not isotropic in the 'CMB frame'. This calls into question the standard practice of boosting to this frame to analyse cosmological data, in particular to infer acceleration of the Hubble expansion rate using Type Ia supernovae, which is then interpreted as due to a Cosmological Constant Λ. We find that the inferred acceleration is anisotropic (in the direction of the CMB hotspot) and likely illusory because of our being embedded in a coherent bulk flow, rather than due to dark energy.

Subir Sarkar received his PhD (1982) from the Tata Institute of Fundamental Research, Bombay, where he was a staff member from 1979-84. Since 1990 he has been at the University of Oxford, where he was appointed Professor in 2006 and Head of the Particle Theory Group 2011-19. His interests lie at the interface of fundamental physics with astrophysics and cosmology - dark matter, dark energy, inflation & the cosmic microwave background, neutrinos, primordial nucleosynthesis, etc. He also works on high energy cosmic rays, neutrinos & gamma-rays and belongs to the IceCube Neutrino Observatory and the Cherenkov Telescope Array collaborations. Earlier, he worked on the Pierre Auger Observatory and the CERN BEBC Beam Dump experiment. In 2017 he was awarded the IUPAP-TIFR Homi Bhabha prize for "distinguished contributions in the field of high energy cosmic ray physics and astroparticle physics over an extended academic career.

3:30 p.m., Wednesday, January 29th, 2025
Auditorium, Indian Institute of Astrophysics

High Tea 3:00 pm, First Floor Lounge, IIA