Open Talk

2nd January, 2019 **4:00 PM** **Fermion**

SPEAKER

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TITLE OF THE TALK

Nonclassicality of the harmonic-oscillator state persisting up to macroscopic domain

ABSTRACT

Can the most "classical-like" of all quantum states, namely the Schrödinger coherent state of a harmonic oscillator, exhibit nonclassical behavior? We find that for an oscillating object initially in a coherent state, merely by observing at various instants which spatial region the object is in, the Leggett-Garg inequality (LGI) can be violated through a genuine negative result measurement, thereby repudiating the everyday notion of macrorealism. This violation thus reveals an unnoticed nonclassicality of the very state which epitomizes classicality within the quantum description. It is found that for any given mass and oscillator frequency, a significant quantum violation of LGI can be obtained by suitably choosing the initial peak momentum of the coherent state wave packet. It thus opens up potentially the simplest way (without coupling with any ancillary quantum system or using nonlinearity) for testing whether various recently engineered and sought after macroscopic oscillators, such as feedback cooled thermal trapped nanocrystals of ~106–109 amu mass, are indeed bona fide nonclassical object.

HOST FACULTY

Professor Archan S Majumdar

Senior Professor

Department of Astrophysics & Cosmology

S. N. Bose National Centre for Basic Sciences