Contribution ID: **187** Type: **Talk in the parallel session**

A post Newtonian modification of the gravitational potential at the extreme length/energy scales

Tuesday 6 July 2021 11:20 (20 minutes)

The Post Newtonian (PN) expansion of General Relativity (GR) yields a series of potentials that accurately describe the trajectories of compact binaries to a very high degree of accuracy. In the mathematical treatment of PN expansion of GR, a relation is established between the ratio of the orbital velocity to the speed of light and the compactness-to-closeness ratio: the ratio between average orbital radii and the distance between the Center of Mass (COM) of the binary counterparts. Over the evolution of the binary, the aforementioned relation establishes a series of potentials sourced by a particular multipole moment of the sources at a particular PN order. Whereas the standard PN expansion works at a range of distances (usually in the order of a few thousand kilometers to a few kilometers) for compact binaries with mass-radii ratios comparable to unity, the method fails at reproducing the behavior of such objects at *large* length scales; and is also theoretically expected to not hold for the *very short* lengths. In this talk, a generalized gravitational action, which is a simple example of a quadratic extension to GR, is PN expanded in the same spirit of the Landau-Lifshitz formalism, and a series of potentials are obtained that reproduces Einsteinian behavior at appropriate scales, with non-trivial behavior at scales where GR is expected to break down. This talk will cover both the infrared and the ultraviolet energy scales and the modifications expected at such scales for a quadratic extension to the GR action.

Author: Dr BHATTACHARYYA, Soham (AEI Hannover)

Presenter: Dr BHATTACHARYYA, Soham (AEI Hannover)

Session Classification: Theories of Gravity: Alternatives to the Cosmological and Particle Standard Models

Track Classification: Alternative Theories: Theories of gravity: alternatives to the cosmological and particle standard models