Contribution ID: **199** Type: **Talk in a parallel session**

Linear dynamics and gravitational waves in gravitational quantum field theory

Friday, July 12, 2024 5:20 PM (20 minutes)

The gravitational quantum field theory is a gauge formulation of the gravity dynamics based on the inhomogeneous spin gauge symmetry, which leads to the generalized Einstein equation. In order to test this theory, we linearize the dynamic equations of gravitational interaction by keeping terms up to the leading order in the dual gravigauge field. We then apply the linearized dynamic equations into two particular gravitational phenomena. Firstly, we consider the linearized equations in the absence of source fields, which is shown to have five physical propagating polarizations as gravitational waves, i.e., two tensor modes, two vector modes, and one scalar, instead of two tensor polarizations in the general relativity. Secondly, we examine the Newtonian limit in which the gravitational fields and the matter source distribution are weak and static. By deriving the associated Poisson equation, we obtain the exact relation of the fundamental interaction coupling in the gravidynamics with the experimentally measured Newtonian constant. We also make use of non-relativistic objects and relativistic photons to probe the Newtonian field configurations. In particular, the experiments from the gravitational deflection of light rays and the Shapiro time delay can place stringent constraints on the linearized gravidynamics in the gravitational quantum field theory.

Authors: HUANG, Da (National Astronomical Observatories, Chinese Academy of Sciences); Mr TANG, Yong (University of Chinese Academy of Sciences); Mr MA, Yong-Liang (Nanjing University); Mr ZHOU, Yu-Feng (Institute of Theoretical Physics, Chinese Academy of Sciences); Mr GAO, Yuan-Kun (University of Chinese Academy of Sciences); WU, Yue-Liang (UCAS)

Presenter: HUANG, Da (National Astronomical Observatories, Chinese Academy of Sciences)

Session Classification: Low frequency gravitational waves: sciences and detections

Track Classification: Gravitational Waves (GW): Low frequency gravitational waves: sciences and detections