Contribution ID: **92** Type: **not specified**

How a gravitational wave background affects particle processes

Monday, 20 April 2026 18:05 (25 minutes)

In one of his final papers, Steven Weinberg, together with Raphael Flauger, asked whether gravitational waves (GWs) can be attenuated through their interactions with matter. They argued that no attenuation occurs, owing to a cancellation between graviton absorption and stimulated emission, as inferred from leading-order soft-graviton arguments.

In this talk, I revisit this reasoning and show that it fails for the converse problem: the influence of a gravitational-wave background on matter. For unstable particles, real graviton emission and absorption appear to enhance decay rates. However, these apparent effects are a mirage, arising from an overreliance on leading-order perturbation theory.

To resolve this issue, we formulate a new version of Weinberg ' s soft graviton theorem that properly accounts for the presence of a graviton medium. We find that the mutual transparency of matter and gravitational radiation is preserved in general cases. However, we also identify an extreme regime where a new IR effect might emerge.

Primary author: AI, Wenyuan (Tsung-Dao Lee Institute, Shanghai Jiao Tong University)

Presenter: AI, Wenyuan (Tsung-Dao Lee Institute, Shanghai Jiao Tong University)

Session Classification: Plenary Theory 15: Gravitational Waves (Room 567, Chair Ye-Ling Zhou)