Contribution ID: **85** Type: **not specified**

On the effective action of compact objects from full GR

Friday 7 July 2023 09:40 (20 minutes)

Calculations involving compact objects, such as post-Newtonian (PN) or self-force calculations, are greatly simplified by treating the body as point particles. Going to higher orders in compactness introduces successively higher order multipolar structure to the compact object. Effective field theory methods provide a systematic tool to account for these finite size effects, by using an effective world-line action to describe the objects. This effective action has proven to work very effectively, but is a postulate that has not been derived from first principles. In this talk, we present such an effective action for compact objects in from first principles in General Relativity. For a spherically symmetric body, we show how a multipolar decomposition of the action recovers the traditional effective field theory action. In particular, this derivation provides a geometrical understanding of the effective action. Moreover, it shows us how the nature of the horizon leads to the vanishing of the Love number for Schwarzschild black holes. Additionally, it clarifies the relation between the Love numbers that enter PN calculations (via the effective action) and the Love numbers computed from the metric of a tidally deformed object.

Presenter: KHERA, Neev (University of Guelph)

Session Classification: Friday Morning