

Black Hole Scattering: the Self-Force Approach

Thursday 14 December 2023 16:00 (30 minutes)

Calculations of the scatter angle in hyperbolic black hole encounters have been of recent cross-disciplinary interest, driven by its potential to advance post-Minkowskian theory and the effective-one-body model of binary dynamics. In this talk I will consider the self-force approach to modelling black hole scattering, starting with a general introduction to self-force theory. I will then motivate our interest in applying self-force techniques to scattering and discuss recent results in this area. For the main part of the talk, I will discuss frequency-domain numerical methods to calculate self-force along scatter orbits. Well established for bound orbits, frequency-domain methods are valued for their high accuracy and efficiency but face numerous challenges when extended to unbound systems. I will summarise these problems and our solutions using a scalar-field toy model, presenting our numerical results to demonstrate the merits and remaining limitations. The talk will conclude by considering the direction of future work in this field, including the prospects for an extension to gravity.

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