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Geometric optics, its corrections, and Green functions in curved spacetimes

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Geometric optics and its corrections are typically derived using a high-frequency WKB ansatz, which results in a tower of transport equations along null geodesics. Separately, field propagation can be described using Green functions, which are known to have a Hadamard form involving certain bitensors. In this talk, it will be explained how these two perspectives on field propagation complement one another. For example, using a result from geometric optics, certain aspects of Green functions near the light cone can be shown to transform very simply under wide classes transformations applied to the background metric. One aspect with this property is the luminosity distance, which implies that it depends relatively little on the geometry in between the source and the observer.

Primary author: HARTE, Abraham (Dublin City University)

Presenter: HARTE, Abraham (Dublin City University)

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