

# An Open System Approach to Gravitational Waves

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Several open problems in cosmology—including the nature of inflation, dark matter, and dark energy—involve spacetime-filling media with unknown microphysics, and can be probed so far only through their gravitational effects. This observation motivates a systematic open-system approach, in which gravity evolves in the presence of a generic, unobservable environment. In this talk, I will present a general framework for open gravitational dynamics based on General Relativity and the Schwinger-Keldysh formalism. As an application, I will describe the most general conservative and dissipative corrections to gravitational wave propagation in such media. I will conclude by discussing the phenomenological implications, highlighting potential observational signatures of these effects.

**Auteur:** Dr COLAS, Thomas (DAMTP - University of Cambridge)

**Orateur:** Dr COLAS, Thomas (DAMTP - University of Cambridge)

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