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Tidal heating of black holes and exotic compact objects on the brane

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During the early phase of in-spiral of a binary system, the tidal heating of a compact object due to its companion plays a significant role in the determination of the orbital evolution of the binary. The phenomenon depends crucially on the 'hairs', as well as on the nature of the compact object. It turns out that the presence of extra dimension affects both these properties, by incorporating an extra tidal charge for braneworld black holes and also by introducing quantum effects, leading to the possible existence of exotic compact objects. It turns out that the phasing information from tidal heating in the gravitational wave waveform can constrain the tidal charge inherited from extra dimension to a value $\sim 10^{-6}$, the most stringent constraint, to date. Moreover, second-order effects in tidal heating for exotic compact objects, also reveal an oscillatory behavior with respect to spin, which has unique signatures.

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