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Importance of the tidal heating in binary coalescence

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With the observation of the multiple binary inspirals, we begin to question whether the components of the binary are black holes or some exotic compact objects (ECO). The black holeness or the deviation from it can be tested in several ways. The distinguishing feature of a black hole from other exotic compact objects is the presence of the horizon. This surface acts as a one-way membrane, that absorbs energy. Due to this different behavior from ECOs in the late stages of an inspiral black holes exchange energy, these backreact on the orbit, transferring energy and angular momentum from their spin into the orbit. This effect is called tidal heating. In Phys.Rev. D99 (2019) no.8, 084001 we argued that the tidal heating can be used as a test for the presence of the horizon, and for that, we introduced horizon parameter (H). Using H we showed that in LISA, presence or absence of the horizon can be tested accurately as well as precisely. In arXiv:1910.07841 we compute the orbital dephasing and the gravitational-wave signal emitted by a point particle in circular, equatorial motion around a spinning supermassive object to the leading order in the mass ratio. We showed that the absence of absorption by the central object can affect the gravitational-wave signal dramatically, especially at high spin. As result it allows us to put an unparalleled upper bound on the reflectivity of exotic compact objects, at the level of O(0.01)%. This can be used even in near
equal mass binaries to search for the horizon.

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