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# Universal gravitational self-force for a point mass orbiting around a compact star

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In this work, we study the gravitational backreaction (i.e., the“self-force”) of a point mass moving around a nonrotating, compact star on a circular orbit. We find that the additional self-force, comparing with the case with a point mass orbiting around a Schwarzschild black hole, can be well characterized by a universal frequency-dependent function multiplied by the (dynamical) tidal deformability of the compact star. This finding provides the foundation for building the waveform model for an extreme mass-ratio inspiral system around a starlike black hole mimicker, which is relevant for testing general relativity and exotic compact objects with space-borne gravitational-wave detectors.

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