Particle plunging into a black hole in massive gravity: Excitation of quasibound states and quasinormal modes

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We determine the waveform generated by a particle plunging from slightly below the innermost stable circular orbit into a Schwarzschild black hole and analyze its spectral content. We work, at first, with a "toy-model" where the graviton field is replaced by a massive scalar field linearly coupled to the plunging particle, such a toy model permitting us to exhibit and interpret some important effects. Then, we show that these effects are also present in massive gravity and could be used to test these extensions of general relativity.