Dilatonic Imprints on Exact Gravitational Wave Signatures

Fiona McCarthy,[1,2] David Kubizňák,[1,2,*] and Robert B. Mann[1,2]

[1]*Perimeter Institute, 31 Caroline Street North, Waterloo, ON, N2L 2Y5, Canada*

[2]*Department of Physics and Astronomy,*
University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1

Abstract

By employing the moduli space approximation, we analytically calculate the gravitational wave signatures emitted upon the merger of two extremally charged dilatonic black holes. We probe several values of the dilatonic coupling constant a, and find significant departures from the Einstein–Maxwell ($a = 0$) counterpart studied in [1]. For (low energy) string theory black holes ($a = 1$) there are no coalescence orbits and only a memory effect is observed, whereas for an intermediate value of the coupling ($a = 1/\sqrt{3}$) the late-time merger signature becomes exponentially suppressed, compared to the polynomial decay in the $a = 0$ case without a dilaton. Such an imprint shows a clear difference between the case with and without a scalar field (as for example predicted by string theory) in black hole mergers. Based on [2].

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[1] J. Camps, S. Hadar and N. S. Manton, *Exact Gravitational Wave Signatures from Colliding Extreme Black Holes*, Phys. Rev. D **96**, no. 6, 061501 (2017) [arXiv:1704.08520 [gr-qc]].

[2] F. Mccarthy, D. Kubiznak and R. B. Mann, *Dilatonic Imprints on Exact Gravitational Wave Signatures*, Phys. Rev. D **97**, no. 10, 104025 (2018) [arXiv:1803.01862 [gr-qc]].

* dkubiznak@perimeterinstitute.ca