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Ringdowns for black holes with scalar hair: the large mass case

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Black hole quasi-normal mode (QNM) frequency spectrums can probe deviations from General Relativity. We construct an effective field theory scheme for QNMs in shift-symmetric scalar-tensor theories with second order equations, exploiting the behaviour of the black hole's scalar charge in the large mass limit. We find a drastic simplification; the QNM calculation reduces to solving sourced QNMs on a Kerr background. Our analysis, which is particularly suited for black holes in the LISA range, places limits on the prospects of detecting evidence of scalar hair with ringdown signals.

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