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Late Inspiral and Merger of Binary Black Holes in Scalar-Tensor Theories of Gravity[1] JAMES HEALY, TANJA BODE, Center for Relativistic Astrophysics and School of Physics, Georgia Institute of Technology, ROLAND HAAS, TAPIR, California Institute of Technology, ENRIQUE PAZOS, Departamento de Matematicas, Universidad de San Carlos, PABLO LAGUNA, DEIRDRE SHOEMAKER, Center for Relativistic Astrophysics and School of Physics, Georgia Institute of Technology, NICOLAS YUNES, Department of Physics, Montana State University — Gravitational wave observations will probe non-linear gravitational interactions and thus enable strong tests of Einstein's theory of general relativity. We present a numerical relativity study of the late inspiral and merger of binary black holes in scalar-tensor theories of gravity. We consider black hole binaries in an inhomogeneous scalar field, specifically binaries inside a scalar field bubble, in some cases with a potential. We calculate the emission of dipole radiation. We also show how these configurations trigger detectable differences between gravitational waves in scalar-tensor gravity and the corresponding waves in general relativity. We conclude that, barring an external mechanism to induce dynamics in the scalar field, scalar-tensor gravity binary black holes alone are not capable of awaking a dormant scalar field, and are thus observationally indistinguishable from their general relativistic counterparts.

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