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Theory-agnostic framework for dynamical scalarization of compact binaries MOHAMMED KHALIL, NOAH SENNETT, University of Maryland, College Park, JAN STEINHOFF, ALESSANDRA BUONANNO, Max Planck Institute for Gravitational Physics — Several classes of modified theories of gravity suggest that gravity may undergo a phase transition —known as spontaneous scalarization— in the strong-field regime. The detection of such a new phase would constitute a smoking-gun for corrections to general relativity at the classical level. Using a strong-field-agnostic effective-field-theory approach, we show that all theories that exhibit spontaneous scalarization can also manifest dynamical scalarization, a phase transition associated with symmetry breaking in a binary system. We derive an effective point-particle action that provides a simple parametrization describing both phenomena, which establishes a foundation for theory-agnostic searches for scalarization in gravitational-wave observations. This parametrization can be mapped onto any theory in which scalarization occurs; we demonstrate this point explicitly for binary black holes with modified electrodynamics.

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