

## **Strong field dynamics of bosonic fields: Looking for new particles and modified gravity**

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Gravitational wave and electromagnetic observations of strongly gravitating systems not only allow us a window into mergers of black holes and neutron stars, but also have the potential to uncover new fundamental physics. I will discuss some of the challenges and strategies for studying the dynamics of bosonic fields both minimally and non-minimally coupled to gravity, and how simulations can be used to tackle nonlinear regime. With some examples, I will illustrate how these systems can be used to look for new bosons, test the black hole paradigm by providing alternative exotic compact objects, and make predictions for modified theories of gravity.