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High accuracy binary modelling in scalar-tensor theories of gravity using the self-force approach

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A key science target for LISA is testing General Relativity by measuring extreme-mass-ratio inspirals. Modelling such binaries with numerical relativity is not viable due to the disparate length scales. Perturbation theory comes to the rescue: leveraging the disparate length scales, we can model the binary using the self-force approach. Great effort is being expounded in pursuing high-accuracy self-force models in General Relativity. A chief obstacle in producing these models is obtaining the necessary second-perturbative-order contributions. However, testing our fundamental theory of gravity also requires models in alternative theories. We can then measure which models best agree with LISA data. In this talk, I formulate the self-force method in general shift-symmetric scalar-tensor theories of gravity to second-perturbative-order. I then comment on how difficult it will be to produce the high-accuracy waveform templates in these theories in time for LISA's launch in circa 2035.

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