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Prospects of Probing Dark Energy with eLISA: Standard versus Null Diagnostics

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Gravitational waves from supermassive black hole binary mergers along with an electromagnetic counterpart has the potential to shed 'light' on the nature of dark energy in the intermediate redshift regime. An accurate measurement of dark energy parameters at intermediate redshift is extremely essential to improve our understanding of dark energy, and to possibly resolve couple of tensions involving cosmological parameters. We present a Fisher matrix forecast analysis in the context of eLISA to predict the errors for three different cases: the non-interacting dark energy with constant and evolving equation of state (EoS), and interacting dark sectors with a generalized parametrization. In all three cases, we perform the analysis for two separate formalisms, namely, the standard EoS formalism and the model-independent null diagnostics using \textit{Om} parametrization for a wide range of fiducial values in both phantom and non-phantom regions, in order to make a comparative analysis between the prospects of these two diagnostics in eLISA. Our analysis reveals that it is wiser and more effective to probe null diagnostics instead of the standard EoS parameters for any possible signature of dark energy at intermediate redshift measurements like eLISA.

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