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Testing Einstein-aether theory by observations of gravitational wave

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Einstein-aether theory is a vector-tensor theory with the vector (aether) field that is always timelike and unity. It is self-consistent (such as free of ghosts and instability), and satisfies all the experimental tests carried out so far. Its Cauchy problem is well posed, and energy is always positive (as far as the hypersurface-orthogonal aether field is concerned). In addition, BHs exist and can be formed from gravitational collapse of realistic matter.

In this talk, we shall present our recent studies of gravitational waves (GWs) produced by massive and compact objects in Einstein-aether theory, including their waveforms, polarizations, response function, its Fourier transform, and energy loss rate through three different channels of radiation, the scalar, vector and tensor modes. Combination of such theoretical predictions with observations of GWs can bring severe constraints on the theory.

Primary authors: Dr LIN, Kai (China University of Geosciences); WANG, Anzhong (Baylor University); Dr ZHANG, Chao (Baylor University); Dr ZHAO, Xiang (Baylor University); Prof. ZHU, Tao (Zhejiang University of Technology)

Presenter: Dr LIN, Kai (China University of Geosciences)

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