Polarization Modes of Gravitational Waves in a New f(R) Gravity Model

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We have introduced a new f(R) gravity model [1] and compared it with two other most viable models in this area viz., the Starobinsky model [2] and the Hu-Sawicki model [3]. We have constrained the model using Gravitational Waves (GWs) event GW170817 and seen that the model is viable in terms of constraints put by GWs events. We have studied the polarization modes of GWs in this model and it is found that there exist three polarization modes of GWs in this theory, and the third polarization mode is a mixed state of massive longitudinal mode and massless breathing mode. Being massive this third polarization mode propagates slowly in the spacetime in comparison to the tensor modes. We have also used a new set of Newman-Penrose scalars modified by us to confirm the results. This new set of Newman-Penrose scalars are applicable to any metric theories with massive or massless GWs.

References:

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