Possibility of gravitational wave echo from strange stars transpired by linear equation of state

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In the last couple of years, the tentative evidence for Gravitational Wave Echoes (GWEs) in the LIGO/Virgo observations of binary black hole mergering events have been reported. In the post merger event of GW170817, at a significance level of 4.2σ the tentative GWE of frequency 72Hz has been recently claimed. Theoretically it has also been proposed that the echo signal can originate from ultra-compact star, if they features a photon sphere capable of trapping the gravitational waves. In GW170817 event the final massive (2-3M_0) ultra-compact star is not firmly established. So this ulta-compact object can be considered as a strange star. Strange stars are extremely dense matter with particular mass-radius relationship. We examine the possibility of GWE from the final massive object of the GW170817 event, by considering it to be a starnge star. We have chosen the linear Equation of State (EoS) to depict strange star configuration. We have evaluated the frequency of corresponding GWEs. The corresponding characteristic echo time and the repetition of echo frequencies are also calculated. Using this stiff EoS we find that such stars can emit GWE frequency in the range of tens of kilohertz. Also for this model with a range of linear constant values, GWE frequencies are different. So we observed a model parameter dependent nature of GWE.

References:

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