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Compact Star Merger as Progenitor of Low Redshift GRBs and the Occurrence Rates of Gravitational Sources and Kilonovae (online talk)

Thursday, 15 June 2023 09:00 (30 minutes)

Bimodal distribution of duration of gamma-ray bursts (GRBs) has led to two progenitors; compact star mergers (two neutron stars, NSs or a NS and a black hole), for short GRBs (SGRBs),
and collapsars for long GRBs (LGRBs). It is expected that formation rate (FR) of LGRBs should be similar to the cosmic SFR, while that of SGRBs to be delayed relative to the SFR.
The localization of some LGRBs in star forming galaxies and some SGRBs away form such regions support this expectation. Also SGRBs are associated with gravitational wave (GW) sources and kilonovae.
However, several independent investigations of the FRs of LGRBs, using the Efron-Petrosian non-parametric method show a that is significantly larger than SFR at low redhifts.
I will review these results, present a new result on the FR of SGRBs, and show that decomposition of the FR of LGRBs into a SFR and low redshift components leads a low redshift
FR similar to that of SGRBs and delayed SFR. These suggest that low redshift LGRBs also have compact star mergers as progenitor increasing rate of the GW sources and kilonovae.
Recent discovery of association of a low redshift LGRB with a kilonova complements our findings.

Presenter: Prof. PETROSIAN, Vahe (Stanford University)

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