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Multi-messenger and multi-wavelength constraints on FRB progenitors and emission mechanisms

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Follow-up observations are crucial to our understanding of fast radio bursts (FRBs), and have enabled studies of their host galaxies and persistent counterparts. As FRB localizations become routine, multi-wavelength simultaneous & post-burst observations will allow us to begin to constrain and characterise the progenitors and the emission mechanisms powering FRBs. In this talk, I will present recent theoretical & observational work undertaken to predict optical and radio counterparts to FRBs in magnetar and merger progenitor frameworks.

In the former, I will discuss our post-burst observations of FRB 200428 from Galactic magnetar SGR 1935+2154, which provides strong evidence against the afterglow expected within the synchrotron maser shock model. In the latter, I will briefly discuss a new mechanism for producing FRB-like bursts in neutron star mergers, before detailing prospects for detecting gravitational wave, kilonova, and radio afterglow counterparts. I will conclude by presenting stringent new optical constraints on the association between GW190425 and FRB190425.

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