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Type : **Contributed talk**

Evaluating magnetars as the progenitors of fast radio bursts

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Fast radio bursts (FRBs) are micro-to-millisecond-duration radio transients originating from extragalactic distances. While thousands of FRBs have been detected, their origins remain unknown. Many FRB theories invoke highly magnetised neutron stars, called magnetars, as FRB progenitors. In this talk, I will evaluate the magnetar progenitor scenario using recent results from the CHIME/FRB telescope.

The most energetic FRBs provide crucial insights into their emission mechanisms and progenitor models. I will present constraints on the maximum energy of FRBs derived from the largest sample of ~3,000 one-off bursts in the second CHIME/FRB catalog. Our results indicate that the isotropic energies of the most energetic FRBs are collectively limited to $\sim 10^{42}$ erg, thereby constraining the energy reservoir of their sources. Under standard assumptions for the radiative efficiency factor between radio and high-energy emission, this energy limit is consistent with the energies of the most powerful magnetar giant flares.

Furthermore, the occurrence of most FRB sources inside star-forming galaxies supports an origin in magnetars formed via core-collapse supernovae. However, I will present the first ever localization of a repeating FRB far outside a quiescent galaxy, which challenges this theory. We propose that this source resides in a globular cluster, where the magnetar progenitor scenario is only viable if the magnetar formed via exotic formation channels such as compact-object mergers.

Did you give a contributed talk at CASCA 2026?

No

If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

PhD

Which keyword describes the area of focus of this talk?

Transients

Primary author(s) : Ms SHAH, Vishwangi

Presenter(s) : Ms SHAH, Vishwangi

Session Classification : Transients & Cosmology