

Connecting FRBs and Magnetars: Prompt MeerKAT observations of SGR J1935+2154

Abstract

SGR 1935+2154 is currently the most active magnetar in the sky, entering new major outbursts almost yearly since 2014. On one occasion, a bright radio burst, rivalling extragalactic fast radio bursts, was detected from the source, simultaneous to a bright, short X-ray burst. This remarkable discovery forged the way for new avenues to study FRBs, their connection to magnetars, and more generally radio emission from young isolated neutron stars. We propose a MeerKAT ToO observation of SGR 1935+2154 for 27 hours following a new outburst, much of which shadowed by X-ray observations with NICER. Our campaign aims at answering the following: (1) what is the fluence distribution of radio bursts from a magnetar? What is their dynamic spectrum, fine structure, and polarization properties, and how do they compare to canonical FRBs? (2) Do all radio bursts occur simultaneous to X-ray bursts and what is the L_r/L_x distribution? (3) How often does SGR 1935+2154 switch into radio-loud mode, and how does this correlate with the spectral and temporal properties of the source? Such a campaign will certainly provide a treasure trove of information for the FRB and magnetar fields for years to come.