Proposal Abstract:

A wide range of stars end their lives through supernova (SN) explosions which play an important role in observation cosmology as well as chemical evolution of the universe. Nevertheless, their progenitor nature and explosion mechanisms are still unclear. Probing the immediate circumstellar environments prior to their explosions, through electromagnetic emission produced by interaction between the SN ejecta and the circumstellar matter (CSM), offers an important approach to addressing the above questions. For those SNe found to exhibit a substantial amount of ambient CSM as enriched during the final years of the progenitor evolution, the collision of the fast-expanding ejecta with the CSM would manifest as prominent radio emission that is dependent on the CSM density. Therefore, radio observations of transients offer a key test to the landscapes of mapping various stellar explosions with their evolution theories. We propose careful FAST radio diagnostics for a sample of nearby transients, including Type Ia and CC SNe, plus one recurrent nova (a possible SN Ia progenitor), which is expected to explode in late 2024.