

Proposal Abstract:

X-ray dim isolated neutron stars (XDINS) are a rare class of long spin period neutron stars that may have evolved from magnetars via magnetic field decay. They are characterised by a soft and thermal X-ray energy distribution and absence of catalogued counterparts, which make them extremely difficult to detect. We propose to observe five X-ray selected XDINS candidates with FAST to search for pulsed radio emission. The targets are among the most promising XDINS candidates recently selected from the eROSITA All-Sky Survey and XMM-Newton catalogues. For these sources, follow-up X-ray (NICER, XMM-Newton or Chandra) and/or deep optical observations (LBT or ESO-VLT) have already been obtained. However, without a spin period determination, it is not clear whether they are XDINS or belong to other more common (spin-powered or recycled millisecond) pulsar families. Radio observations are now required to establish their evolutionary state and classify the sources among the several classes of Galactic neutron stars. In case of detection, we will further observe the sources in the next GO cycles to derive a precise timing solution. Conversely, a non-detection will pose challenging questions regarding the effects of magnetic beaming and general absence of coherent radio emission in X-ray selected neutron stars.