

FAST Proposal Coverpage

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Project Name:

Timing the Mysterious Fermi Pulsar in Taurus

Project Summary:

PSR J0357+3205 is a radio pulsar toward Taurus discovered by FAST in a targeted pulsar search focused on a local HI bubble, also discovered by this group. Earlier than our radio detection, it was first identified as a gamma-ray pulsar by Fermi and was shown to have a X-ray tail by Chandra. The X-ray absorbing column and pulsar dispersion measure both put it at farther than ~ 1.5 Kpc from the Earth, though neither of the estimate is reliable. Combined with the proper motion seen in Chandra images, such distance suggests >1500 km/s proper motion, i.e. the fastest moving neutron star ever known. If, however, located in Taurus at the close distance of ~ 140 pc, PSR J0357+3205 can be the relic of the nearest supernova ever known, with possible direct impact on Earth. Either outcome will be of significant impact to the respective fields. Pulsar timing will be crucial for determining its distance and resolve the partial coupling between proper motion and distance. The FAST timing proposed here could potentially confirm the important nature of J0357, leading to a major discovery of either fast-moving neutron star or of the first identified originating source of the local hot bubble.