

FAST Proposal Coverpage

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Project Name:

A Pilot Project of Search for Small Scale Structures in the ISM.

Project Summary:

The spatial distribution of neutral gas is important for understanding the interstellar medium (ISM) evolution and star formation. However, the distribution of Tiny Scale Atomic Structures (TSAS), especially the extremely small scale structures with spatial scales ranging from a few to hundreds of AU are largely unexplored. The formation and evolution of TSAS are still on an active debate. Multi-epoch observations of HI absorption against pulsars are a tested, practical observational method to probe the TSAS, due to pulsar's nature on-off state and proper motions of 1 to 100 AU per year. The FAST 19-beam receiver has a powerful capability to detect the new populations of possibly related sub-parsec ISM clouds with high sensitivity and monitoring the detected TSAS traced by pulsars, which help us to understand TSAS formation and evolution. We propose this subset of the project in order to demonstrate the capability of FAST for detecting the TSAS. We propose two-epoch observations, which are separated by about 1.5 months, towards PSR B1929+10 for probing structures ranging from 4 to 640 AU. It allows us to monitor the evolution of the known TSAS traced by PSR B1929+10 and detect the limit spatial scale on turbulent HI fluctuations. If the TSAS is not detected, we can put an upper limit of detection with FAST.