

# FAST Proposal Coverpage

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## Project Name:

*(A 1-line title for your project)*

## A Pilot FAST Ultra Deep Survey (PFUDS)

## Project Summary:

*(A 1 paragraph summary of your project, including its scientific goals and how you will address them. This information will be potentially public.)*

Understanding the evolution of galaxies requires better observations of the accumulation of gas onto galaxies from the intergalactic medium and of galaxy interactions as a function of redshift. A convenient way of studying this with single-dish telescopes is through measurements of the cosmic gas density and the HI Mass Function (HIMF) in various redshift intervals. Due to its superior sensitivity and survey speed compared with Arecibo and the VLA, and its relative freedom from radio frequency interference (RFI), FAST is an excellent instrument for making precision measurements over the last 4 Gyr of cosmic time. Previous blind HI surveys (e.g. HIPASS and ALFALFA) have successfully studied the HIMF, but only in the local Universe. The proposed Pilot FAST Ultra Deep Survey (PFUDS) will be able to detect low-mass galaxies at the receiver redshift limit of 0.35, thus giving an insight into how the HIMF evolves even at low-mass end, where simulations predict that supernova and star-formation feedback will be the most important physical parameter. PFUDS will use FAST to observe two small areas in 20 hours, one with “drift and chase” mode (expected to maximise bandpass stability, as demonstrated at Parkes and Arecibo), the other with OTF mode (more efficient, but possibly not as deep). The result will guide the best observational parameters for future FAST spectral-line observations, including a potential FAST Ultra Deep Survey. The observations will also help guide optimum data reduction methodologies.