

Proposal Abstract:

The Circumgalactic Medium (CGM) holds pivotal information for understanding galaxy evolution, as it is shaped by internal processes within a galaxy and reciprocally influence future gas supplies for star formation. In this pioneering pilot proposal, our objective is to conduct the first-ever direct mapping of diffuse HI emissions surrounding five hard-X-ray selected AGNs, which represent the most luminous AGNs within the 50 Mpc. Each target benefits from an array of observational datasets spanning a wide wavelength coverage, from X-ray to radio, including newly acquired JWST and Herschel FIR data. Our aim is to achieve a detection sensitivity of (5σ) low column densities of $N_{\text{HI}}=2 \times 10^{17} \text{ cm}^{-2}$, with an anticipated CGM mapping radius of up to 100 kpc. The observation will enable us to test models of AGN feedback, assess short- and long-term impacts of AGNs, and elucidate the connection between AGN fueling and large-scale gas distribution. We request a total integration time of 75 hours to observe the five AGNs. As the first initiative of its kind, the FAST-DRAGONS program aims to have broad international impacts and facilitate collaborative efforts to advance our limited understanding of AGN environments, further solidifying FAST's capabilities and influence.