Proposal Abstract:

Asymptotic giant branch (AGB) stars are evolved stars that lose mass, enriching interstellar medium in dust and gas. The outermost parts of the AGB star envelopes are dominated by atomic hydrogen. Here we propose to observe the 21 cm HI line to determine the atomic content in circumstellar envelopes of a special AGB star: o Cet, which is observed to have a detached shell and a cometary tail. This source cannot be observed by the Arecibo telescope but is observable via FAST. Using FAST, we expect to obtain a more extended HI map (30 arcmin $\times$30 arcmin), with more detailed structures revealed by a rms of 1.2 mJy per beam. The aims are: (1) to constrain the structure of the whole envelope for the target star; (2) to derive the mass-loss rate (density), the H2/HI ratio, and the kinetic temperature throughout the entire envelope; (3) study the photodissociation effects in the outer parts under the irradiation by interstellar UV photons; (4) investigate the dissociative influence of shocks; (5) constrain the state of the circumstellar material entering the ambient ISM and study the interaction of the two media.