

Proposal Abstract:

Warm ionized medium (WIM), accounting for over 90% of all H⁺ in the ISM, is a major components of the Milky Way. Nevertheless, the origin of WIM is still under debate. Recent studies attribute the ionization of WIM to the leaked ionizing photons from HII regions that propagate through clumpy PDR ('photon leakage'). NGC7538 displays sign of photon leakage in its western part in which compact HII regions reside. To complement the picture of photon leakage, we propose the observe the whole NGC7538 region with FAST. The observed RRLs from diffuse ionized gas in the vicinity of large HII regions, which are in the eastern part to NGC7538 and attracted less attention than the compact HII regions in west NGC7538, will help us to characterize the photon leakage from more evolved HII regions. The simultaneous observation of HI and RRLs will help us to trace the ionizing photons that penetrating molecular cloud and finally ionizing the atomic gas of ISM. This will be the first ever attempt to detect the ionization of HI by photon leakage, and will nail down that photon leakage is the origin of WIM.