

Proposal Abstract:

As descendants of low- and intermediate-mass stars, planetary nebulae (PNe) are essential objects for our understanding of the history of stellar winds and the life cycle of materials in the Galaxy. However, the observed masses of PNs are much lower than the theoretical upper limit (called “the PN missing mass problem”), challenging for us to establish an accurate representation of the evolution history of these stars. A possible explanation is that the missing mass might be present in HI. The adjacency between HI and highly ionized gas can produce Raman scattering in PNs. Here we propose to observe a sample of Raman scattering PNs. Our scientific goals are twofold: 1) to estimate the mass of atomic gas; 2) to determine Raman scattering efficiency and constrain the scattering model.