

# A detailed study of OH maser-emitting planetary nebulae

## Abstract

The formation of planetary nebulae (PNe) is poorly understood.

Maser emissions are not expected in PNe unless these are extremely young, and therefore the presences of H<sub>2</sub>O/OH masers are crucial to understanding the formation of PNe.

To date, only five PNe with H<sub>2</sub>O maser and seven PNe with OH maser have been confirmed.

This rarity hampers our understanding of the early development of the PNe.

To find new maser-emitting PNe, we (1) identified a sample of 331 young PNe based on the data from radio to submillimeter, and (2) undertook a search for OH maser from the archival data.

We finally obtained a sample of 19 new PNe with OH masers, and five of them are observed by VLA.

We propose the continuum and OH maser observations for the remaining 14 PNe to get the radio continuum spectra and maser lines, aiming to (1) measure the physical properties to study the initial stage of PNe and (2) magnetic field to understand its role in the initial shaping of PNe.