# A Comprehensive Study of Planetary Nebulae in the Galactic Bulge

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**Abstract.**   We describe an on-going observational study to characterize the PN population of the Galactic Bulge.

The PN population in the Bulge is the most complete sample of Galactic PNe known for any stellar population. It is also the only sample of Galactic PNe with known, uniform distances, and is close enough that the nebulae can be resolved. In addition, the progenitors are known to be old, low-mass stars. This uniform population with well-known distance is well suited to statistical study of current topics in PN research: the origin of morphologies and relation to stellar progenitors; enrichment history of the Bulge; and the initial-final mass relation.

However, the observational database for Bulge PNe is still far from complete. Even elementary data such as diameter is often not or only poorly known. We have initiated a program to obtain ground-based imaging and spectroscopy for all known Bulge PN. Imaging data will yield: (1) diameters (already known for less than half the sample); (2) absolute fluxes for images in emission lines, to typical accuracy of 5–10%; (3) morphologies, for objects large enough to be well resolved; (4) stellar magnitudes and Zanstra temperatures, again for well resolved objects. Objects larger than 4 arcsec can be can be well resolved in good seeing from the ground. For small objects, HST imaging is required and a snapshot imaging programme with WFPC2 has been begun in Cycle 11.

Low-resolution spectroscopy yields abundances, allowing the observed nebular properties to be correlated with the stellar progenitors. Good data is already available for about 100 Bulge PN. High resolution spectroscopy can resolve the line profiles: given the velocity profile and a diameter, the dynamical age can then be derived. The dynamical age as function of stellar temperature is the most sensitive indicator of the core mass. Echelle data is being collected at the AAT as as part of this project. The many facets of this survey - diameters and morphologies, physical conditions and abundances, together with kinematics - will allow robust statistical conclusions based on a well-defined PN population.