THE PROGENITORS OF PLANETARY NEBULAE

P. te Lintel Hekkert¹, A.A. Zijlstra²

¹ Mt. Stromlo and Siding Spring Observatories

² Kapteyn Laboratorium, Groningen

Based on a new sample of (IRAS based) OH/IR stars (te Lintel Hekkert et al., 1991, A&AS, in press), and a catalogue of planetary nebulae compiled by Acker (1983, A&AS, 54, 315), we show the relation between these two groups of objects, in terms of the kinematics and the Galactic distribution. In contrast with earlier analyses of samples of OH/IR stars, we find a close correlation between the kinematics of the planetary nebulae and the IRAS based sample of OH/IR stars. In particular, we find that the distribution of the planetary nebulae (PN) shows a good correlation with the OH/IR stars which have a low outflow velocity ($v_{exp} < 12.5$ km s⁻¹). Whether the high outflow velocity OH/IR stars also have a counterpart among PN is not clear.

The majority of the known PN thus appear to originate from low outflow velocity OH/IR stars. The ZAMS progenitor masses are probably in the range 1-1.5 M_{\odot} , and the stellar ages are $\approx 5{-}10{10^9}$ yrs. Only in the plane of the Galaxy may a significant fraction of the PN come from more massive progenitors. In the outer part of the Galaxy, a relatively larger fraction of PN appears to originate from carbon stars instead of OH/IR stars.

A BINARY EVOLUTIONARY MODEL FOR THE PROGENITOR OF SN 1987A

C. de Loore¹, D. Vanbeveren² ¹ Astrophysical Institute, Vrije Universiteit, Brussels, Belgium ² Dept. Physics, Vrije Universiteit, Brussels, Belgium

In this paper we explore the hypothesis that the blue progenitor of SN 1987A was a component of a close binary. It is shown that a blue spectral appearance at the end of core helium burning (and possibly also during the following evolutionary phases) is a natural phenomenon for a star with initial mass between 9 M_{\odot} and 15 M_{\odot} which was originally in a close binary with mass ratio $q \approx 1$ and who accreted at least 8 - 10 M_{\odot} while already being a hydrogen shell burning star. This phenomenon does not depend on the exact treatment of the convective core overshooting, the stellar wind mass loss rate, and the metallicity. A blue SN progenitor in the Galaxy would therefore be a surprise.