A Search for Planetary Nebulae around Hot White Dwarfs

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Time scales for post-AGB stellar evolution are still unclear. In order to study them it is useful to look for old PNe and compare nebula expansion and stellar evolutionary ages. We have selected very hot members from different white dwarf sub-classes. Many of them are objects recently discovered in the Hamburg-Schmidt Survey (Hagen et al. 1995). The sample includes three peculiar objects whose spectra show signatures of an extremely hot wind ($\approx 10^6$ K), namely absorption lines of ultra-high ionized metals, e.g. O VIII (Werner et al. 1995). A complete list is given in the table below. The search was performed by direct Hα narrow band imaging using a wide angle (20'×20') CCD camera (WWFPP) attached to the Calar Alto 1.23m telescope (28.9.-3.10.1995).

The search was entirely negative – with one possible exception: The DO white dwarf PG 0109+111. An asymmetric nebulosity extends about 5' from the star to the southwest, and there are hints that it extends even further out. No WD central star of type DO (i.e. pure helium) is known, with the possible exception of PG 0108+101 (Reynolds 1987), but our image centered on this star does not show any nebulosity. If our detection of an emission nebula around PG 0109+111 is in fact the first PN around a DO white dwarf needs to be confirmed by detailed spectroscopic studies. PG 0109+111 is the most massive DO white dwarf ($M=0.74\,M_\odot$) and among the hottest DOs known ($T_{\rm eff}$=110 000 K, log g=8.0, d=280 pc; Dreizler & Werner 1996). Assuming an expansion velocity of 20 km/sec, we arrive at a linear radius of 0.4 pc and an expansion age of 20 000 years. This contrasts with the post-AGB age of the white dwarf which exceeds 100 000 years (Blöcker 1995).

spectral type	star		
DA	HS 0615+6535	HS 2246+0640	
DAO	HS 0231+0505	HS 2033+0507	
DO	KPD 0005+5106	PG 0038+199	PG 0109+111
	PG 0046+0746	PG 0108+101	PG 0237+116
DO ultrahigh-ionisation	HS 0158+2335	HS 0713+3958	HS 2027+0651
PG 1159	PG 0122+200	HS 0444+0453	HS 2324+3944

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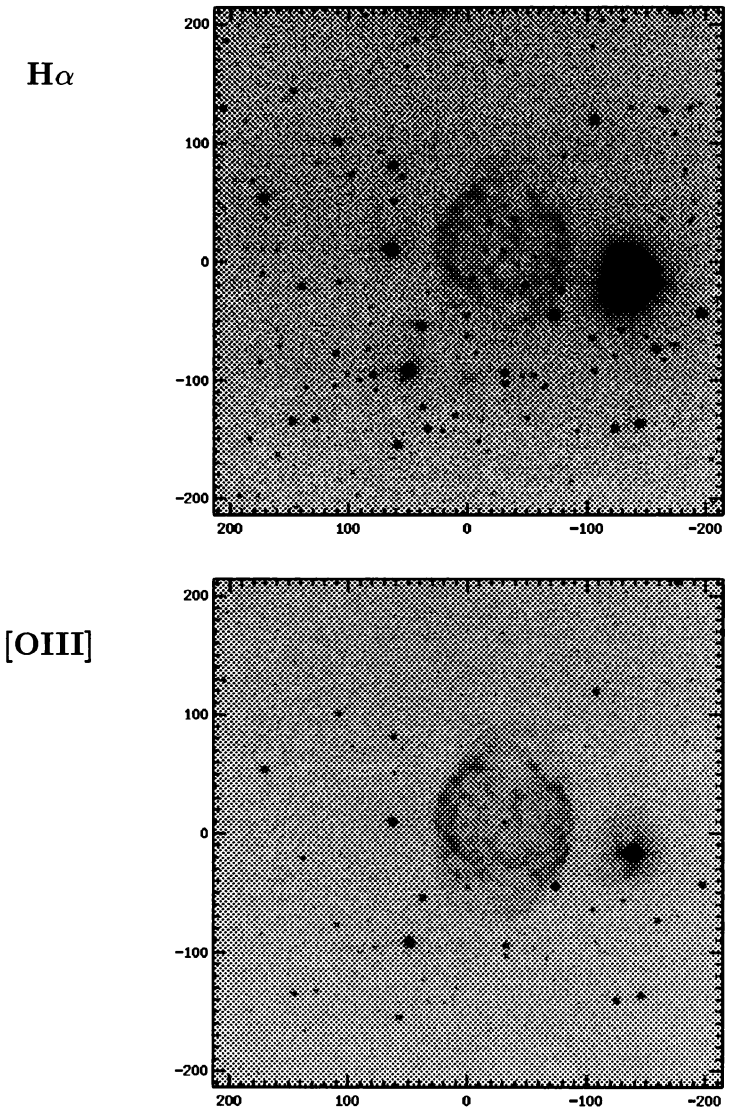

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