Central Stars of MASH Planetary Nebulae

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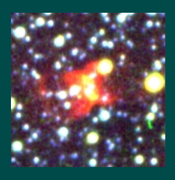
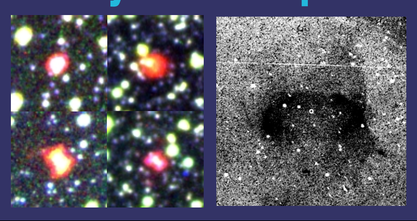
MASH: Macquarie/AAO/Strasbourg Hα Planetary Nebulae catalogue



➔MASH ~900 new PNe (Parker et al. 2006)
•MASH-II ~300 new PNe (Miszalski et al. 2007)
Discovered from AAO/UKST SuperCOSMOS Hα Survey (SHS)
Confirmatory spectroscopy on 2m class telescopes.

MASH-II SHS Discovery Techniques

•IAM photometry search
➔small, stellar-like PNe
•Quotient image search
➔large, evolved PNe

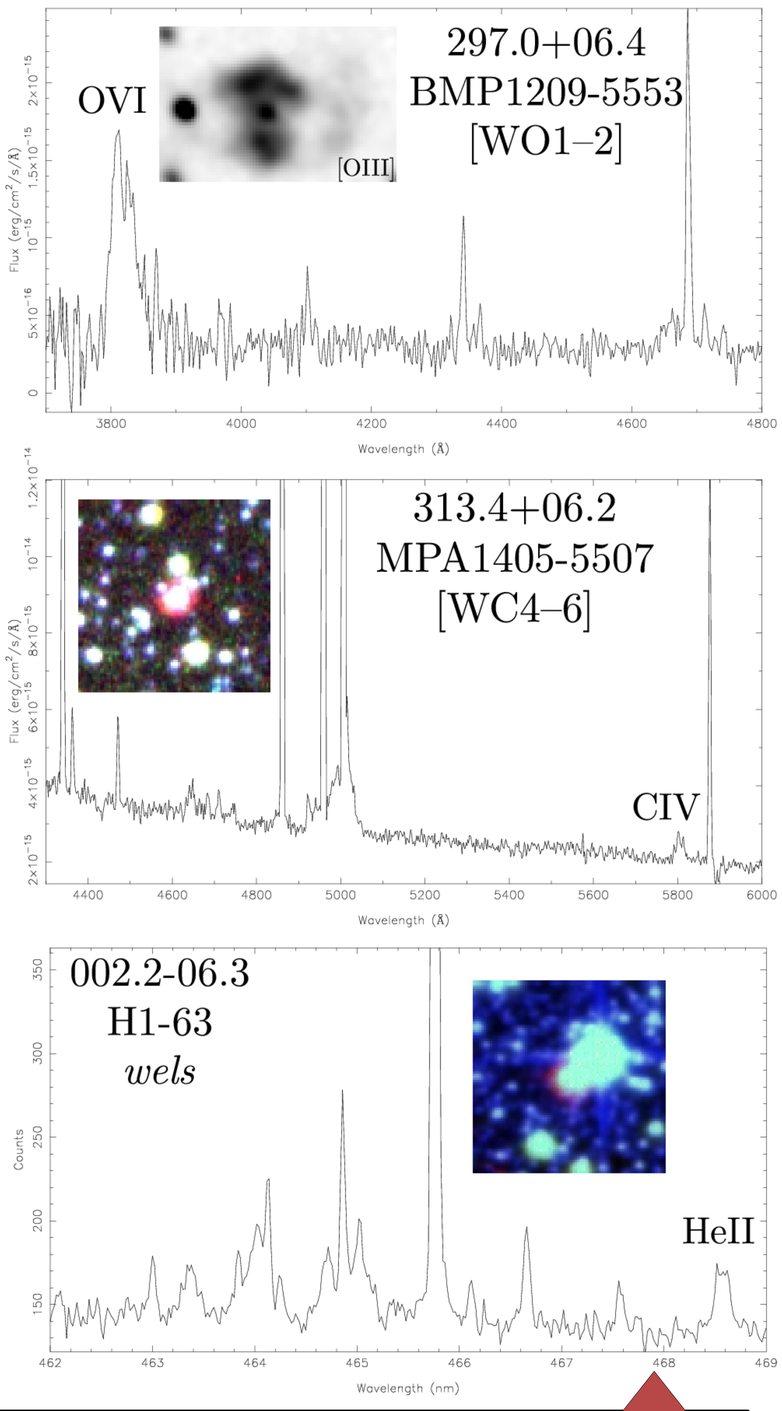


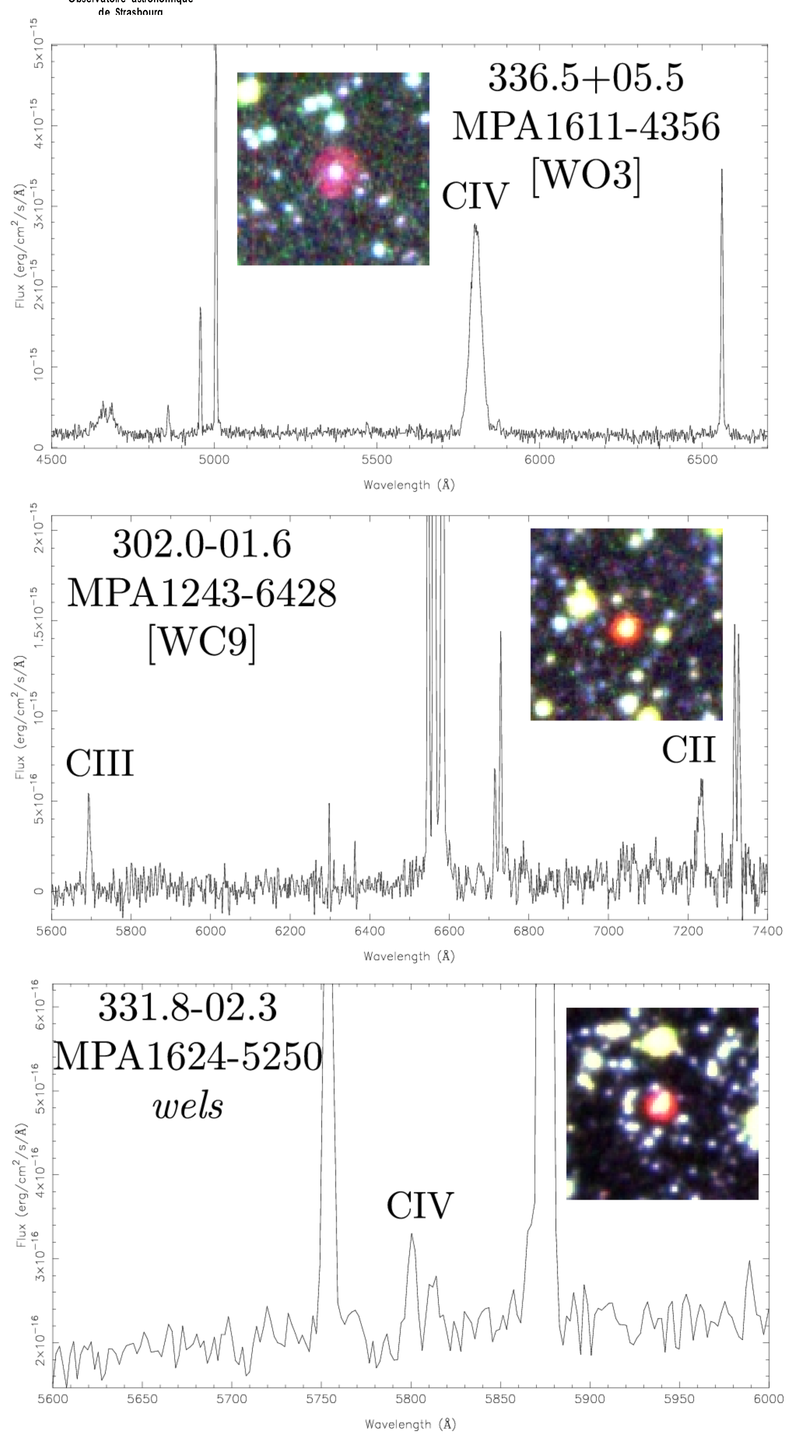
MASH Central Stars

Almost half (40-45%) of all MASH and MASH-II PNe larger than 40 arcsec have blue central star (CSPN) candidates visible on UKST Bj SuperCOSMOS images (Bj~19 mag).
Many of these are of extremely low surface-brightness.

However, only a very small fraction of the blue CSPN have been observed spectroscopically.

During our ongoing spectroscopic programs we have observed:
~30 **new** emission line CSPN
~15 blue continuum, absorption line CSPN.
We give a preliminary overview of both aspects of MASH CSPN.





MASH-II long-slit spectra from ANU 2.3m Dual-Beam Spectrograph (except 002.2-06.3 from VLT-FLAMES LR3). IAU PN G designations, common names and *preliminary* classifications following Acker & Neiner (2003) are shown. Exposure time are 900s (297.0+06.4), 1200s (336.5+05.5), 300s (313.4+06.2), 600s (302.0-01.6), 1200s (002.2-06.3) and 3600s (331.8-02.3).
Resolution is typically ~6Å (FWHM) and scattered light is present at [OIII] /Hα.
Images are taken from SHS/SSS (RGB=Hα,SR,Bj) with exception of PN G297.0+06.4 (NTT/EMMI [OIII] image).

[WR] and other emission line CSPN

Our sample of ~30 MASH CSPN is taken from MASH (2/3) and MASH-II (1/3), including 7 already published (Morgan et al. 2001, 2003 and Parker & Morgan (2003)). We show some of our spectra above (mostly MASH-II).
To this we add a further 6 known PNe, for which have detected the CSPN for the first time in relatively deep VLT-FLAMES (H1-56, H1-63 & M2-29) and AAT 2dF/AAOmega (Pe1-10,K5-20 & H1-23) spectroscopy.

A *preliminary* classification of our **36** CSPN was made following Acker & Neiner (2003).
We find **9** hot [WO] (25%), **13** cool [WC] (36%), **8** *wels* (22%) and **1** WN.
The **5** other spectra showing complex mixtures of emission and absorption features remain to be classified.

However a clear [WR] classification is very difficult for faint and highly reddened CSPN (important lines blueward of 6000A become invisible whereas red CII lines typical of cool [WC] CSPN remain prominent).
Our (mostly confirmatory) spectra are rather inhomogeneous and deeper observations are planned.

Galactic Bulge: The majority of our sample lie outside the Bulge. Disk contamination is difficult to assess for faint objects, e.g. small diameter PNe could be fairly evolved Bulge PNe, or they could be compact foreground PNe beginning their expansion.
Of those that may belong to the Bulge, we find 5 MASH PNe (3 [WC] and 2 [WO]) and 5 known PNe (5 *wels*).
We do not confirm the high proportion of [WC11] CSPN in the Bulge (Górny et al. 2004).

References

Acker A.& Neiner C., 2003, A&A, 403, 609
Górny S. et al., 2004, A&A, 427, 231
Miszalski B. et al., 2007, MNRAS (submitted)
Morgan D.H., Parker Q.A. & Russeil D., 2001, MNRAS, 322, 877
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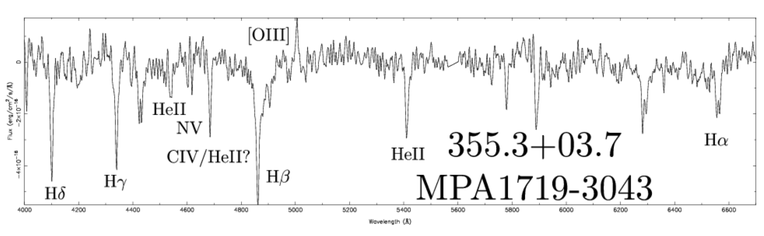
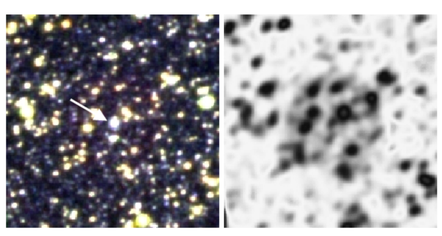
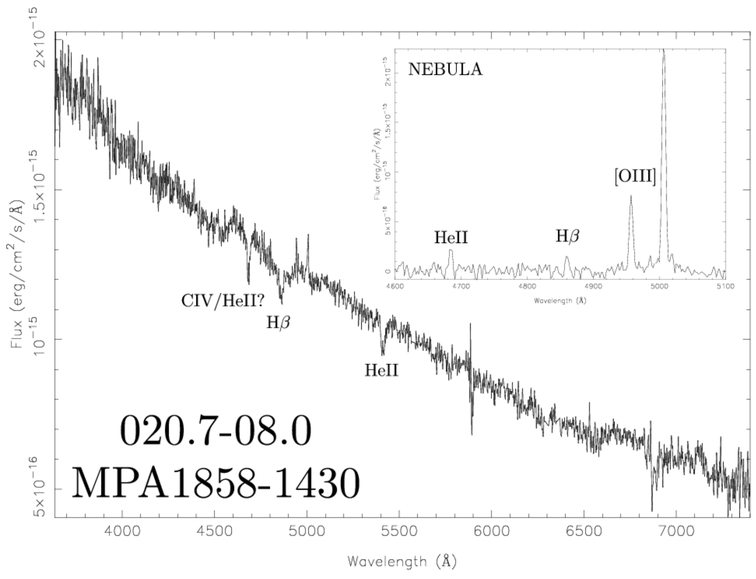
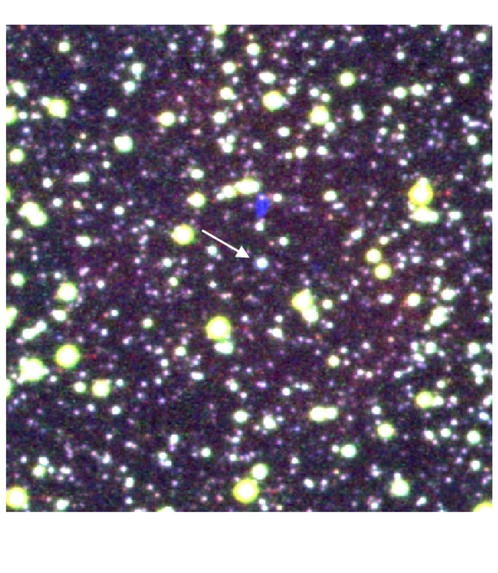
Parker Q.A. et al. 2006, MNRAS, 373, 79 (MASH)

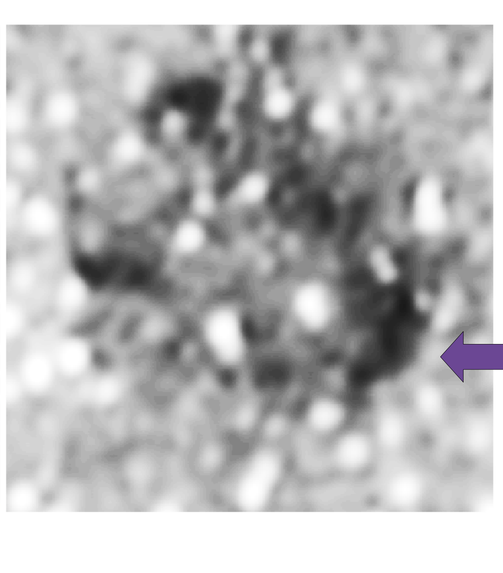




MASH-II long-slit spectra of two extremely faint PNe with blue CSPN from ANU 2.3m Dual-Beam Spectrograph. Resolution is 6Å (FWHM). Exposure times are 1200s (355.3+03.7) and 2400s (020.7-08.0). PN G355.3+03.7 spectrum is continuum subtracted.
Quotient images have been heavily enhanced.







Two extremely faint PNe with blue CSPN

MASH-II has found even more large, evolved PNe with blue central stars.
Here we present two which have long-slit spectra.

PN G355.3+03.7 (MPA1719-3043)
Spherical 65 arcsec diameter nebula (c~0.8) with Bj=16.33 R_2=16.57 CSPN.
CSPN seems to be O(H)?

PN G020.7-08.0 (MPA1858-1430)
Large 120x210 arcsec bipolar nebula (c~0.1) with Bj=16.60 R_2=16.84 CSPN.
CSPN seems to be hydrogen deficient.

Deep analysis of these spectra is planned following recent works by Werner, Rauch and Schönberner. Further details will be published elsewhere.