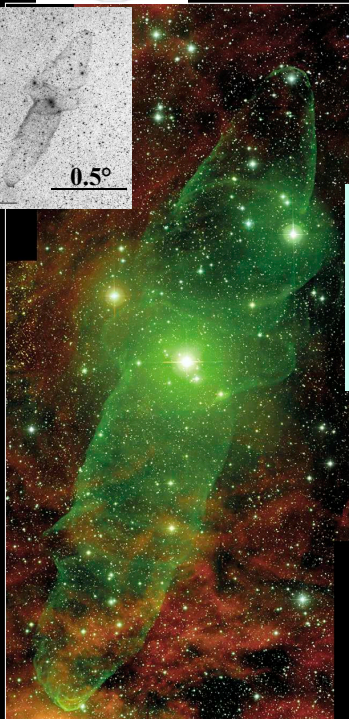


Ou 4, an enigmatic bipolar nebula



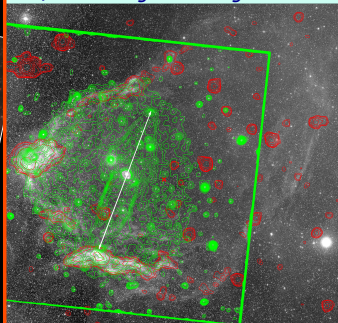
Agnès Acker (1), Nicolas Grosso (1), Romano Corradi (2)
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Ou 4 was discovered by the French amateur astronomer Nicolas Outters on June 2011 and discussed by Acker et al. (2012). The nebula covers 1.2 degree in the sky, and is apparently located inside the HII region Sh 2-129, and centered on HR 8119.



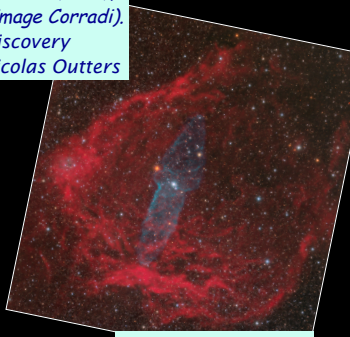
Ou 4 : Image done at the 2.5m Isaac Newton Telescope (INT), Observatorio del Roque de los Muchachos (ORM), La Palma (Image Corradi). In insert : discovery image by Nicolas Outters

Ou 4 and the blister HII region Sh2-129 in the « Champagne phase », ionized by the hot triple early-B star HR 8119 (712 pc) (Nicolas Grosso). The red contour map is the Green Bank 6cm survey, and the green contour map is a smoothed and threshold [OIII] image (Stephane Zoll). The background image is from the DSS2 R-plates.

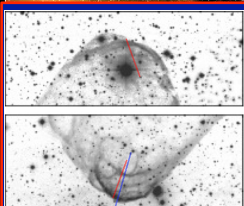


Is Ou 4 launched by the young stars in Sh2-129 ?

The apparent location of Ou4 inside Sh2-129 suggests that Ou4 could be an outflow launched by one of the stars in the central young stellar cluster (like the multiple star HR 8119).



Sh2-129 + Ou 4 (image Ha - [OIII], Nicola Montecchiari)

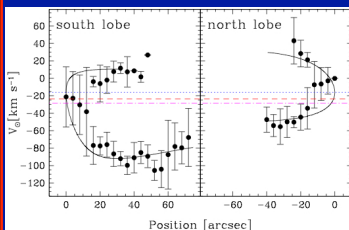


The bow-shocks

The tip of the south lobe of Ou 4 is shock ionized.

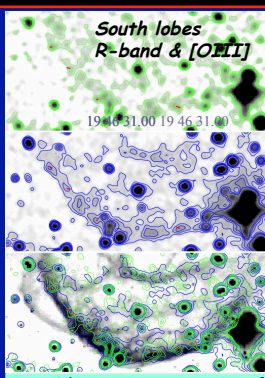
Ou4 could be an outflow launched some 90,000 yr ago by the dynamical decay of a non hierarchical massive stellar system (Bally et al. 2011), HR8119. The matter located in accretion disks, at a distance of 3 AU from a 17.8 M \odot star, has a velocity of 100 km/s, which is consistent with the bow-shocks velocities derived from our model : 112 and 83 km/s.

Details of the bow-shocks in [O III]. The slit position for the lower resolution spectrum is indicated by the long (blue) slit, and by the short (red) slits for the higher resolution ones.

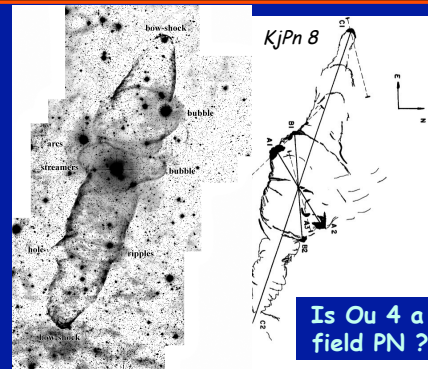


Helio. RV of the lobes (WHT/ISIS spectrograph, Corradi) and bow-shock model (Grosso). Horizontal lines : Blue dotted = helio. RV of HR 8119; dashed and dashed-dotted = RV Sh2-129

A better determination of the proper motion combined with the radial velocity will provide a sound distance evaluation and a definitive proof of the association of Ou4 with Sh2-129.



Possible proper motions of the tip of the south lobe of Ou 4 (~ 2.5" +/- 1.1" red lines - N. Grosso). Top and middle panels: POSS1 (1952-07-22) and POSS2 (1993-06-25) blue plates. Bottom panel: the green and blue contours overlaid on the [OIII] INT mosaic (2012-08-19).



Is Ou 4 a field PN ?

Its morphology appears identical to those of the planetary nebula KJpN8 (Lopez et al.1995). An outburst powered by mass accretion in a binary system, could lead to an ILOT, as proposed for KJpN8 or other bipolar PN (Soker & Kashi 2012). The inner regions of Ou4 may well be a small photoionized core such as in the case of KJpN 8.

References

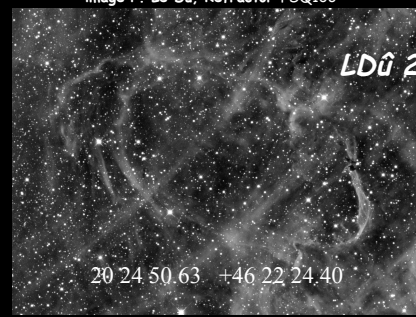
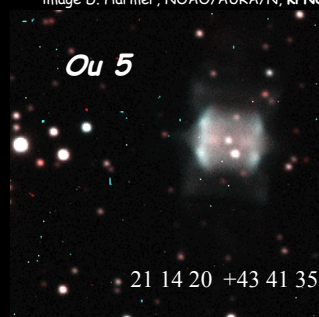
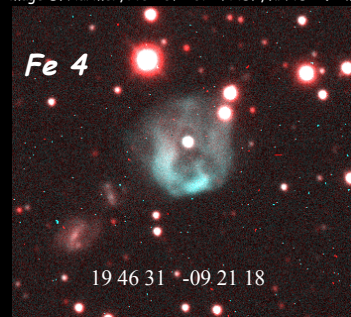
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New asymmetric Planetary Nebulae candidates discovered by French amateurs

discovered by Laurent Ferrero
 image D. Harmer, NOAO/AURA/NSF, KPNO 2.1 m

discovered by Nicolas Outters
 image D. Harmer, NOAO/AURA/N, KPNO 2.1 m

discovered by Pascal Le Dû
 image P. Le Dû, Refractor FSQ106



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