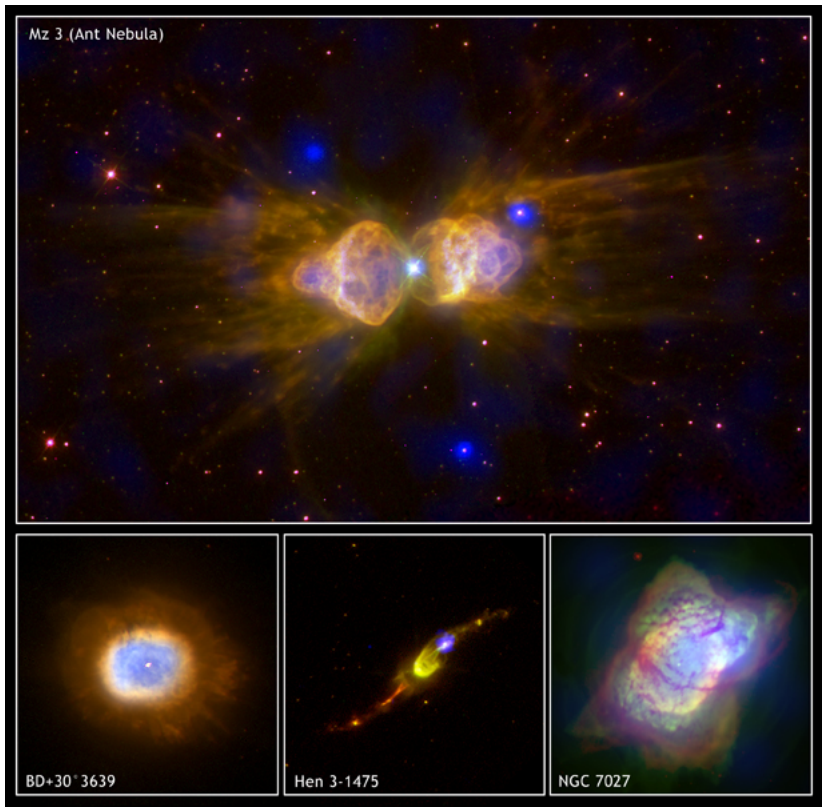
Chandra Science Highlight

Mz 3, BD+30-3639, Hen 3-1475, and NGC 7027: Planetary Nebulas – Fast Winds from Dying Stars



Chandra X-ray Observatory ACIS image.

Credit: X-ray: NASA/CXC/RIT/J.Kastner et al.; Optical/IR: BD +30 & Hen 3: NASA/STScI/Univ. MD/J.P. Harrington; NGC 7027: NASA/STScI/Caltech/J.Westphal & W.Latter; Mz3: NASA/STScI/Univ. Washington/B.Balick

This panel of composite images (x-ray/blue, optical/green, and infrared/red) shows part of the unfolding drama of the last stages of the evolution of sun-like stars. Dynamic elongated clouds envelop bubbles of multimillion degree as produced by high-velocity winds from dying stars. BD+30-3639 appears spherical, but other observations indicate that it is viewed along the pole.

- Planetary nebulas – so called because some of them resemble a planet when viewed through a small telescope – are produced in the late stages of moderate-mass star's life.
- Over a period of a few hundred thousand years, much of a star's mass is expelled at a relatively slow speed, creating a more or less spherical cloud around the star.
- The mass loss eventually uncovers the star's hot core, and the velocity of the gas flowing away from the star jumps to about a million miles per hour.
- Shock waves generated by the collision of high-speed gas from the hot core with the previously ejected loud create the multimillion degree bubbles observed by Chandra.
- The origin of the funnel-shaped winds may be related to strong, twisted magnetic fields near the hot stellar core.

References:

R. Sahai et al. 2003, Astrophys. J. 599, L87 (Hen 3-1475)
J. Kastner et al. 2003, Astrophys. J. 591, L37 (Mz 3)
J. Kastner et al. 2001, Astrophys. J. 550, L189 (NGC 7027)
J. Kastner et al. 2000 Ap.J. 545, L57 (BD +30-3639)

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