The Planetary Nebulae in NGC 6441 and Pal 6

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Jacoby & Fullton (1994, BAAS, 26, 1384) searched 133 of the $\sim$ 150 Galactic globular clusters for Planetary Nebulae (PNe) using the on-band/off-band imaging technique at [O III] λ5007Å. We present *preliminary* abundances and central star properties for the 2 new PN identified in that survey (labeled JaFu 1 and JaFu 2 by Acker, Marcout, & Ochsenbein 1996).

(1) JaFu 1 (diameter of 8" = 0.22 pc) in Pal 6 has low excitation and is located 230" from the cluster center. This separation suggests that JaFu 1 may instead be a bulge planetary, yet its velocity (176 km/s) and extinction ($E_{B-V} = 1.9$) are more-or-less consistent with membership. Preliminary model results derived from limited spectral coverage ground-based data suggest the following central star properties: 0.55 $M_\odot$, T_{eff} =90,000K, L= 800$L_\odot$. Nebular abundances are [He/H]= -0.04, [O/H]= -0.4, [N/H]= 0.0, [S/H]= -0.7. Pal 6 is metal-rich ([Fe/H]$\approx$ +0.2 dex; Minniti 1995, AA, 303, 468), so if JaFu 1 is a member, the nebula is oxygen-poor relative to iron.

(2) JaFu 2 (diameter of 5" = 0.22 pc) in NGC 6441 is very likely a cluster member, having similar velocity (37 km/s), and extinction ($E_{B-V} = 0.4$), in addition to being close to the cluster center (37"). It has extremely high excitation levels, and so very few optical lines are seen. A revised analysis is underway based on UV spectra just obtained from HST; for now, models reproducing all spectral contraints define the following parameters for the central star: 0.56 $M_\odot$, T_{eff} =100,000K, L= 2000$L_\odot$. The nebula abundances are: [He/H]= +0.16, [O/H]= -0.8, [Ne/H]= -0.6. The stars in NGC 6441 have [Fe/H]= -0.5 (Armandroff 1989, AJ, 97, 375); thus, this nebula also is oxygen-poor relative to iron.

Also, we serendipitously found an OH/IR star at 68" west of Ter 2, by virtue of its very red color ($V - I > 8$), which allowed a detection through a tiny red leak in the [OIII] filter. The star may be coincident with IRAS 17242-3045, having OH/IR-like colors.

No other PN candidates were identified. It is unlikely that many cluster PN remain to be found. Stellar death rates in clusters suggest that we should see $\sim$ 16 PN. A total of 4 are known (JaFu 1 and 2 in addition to those in M15 and M22); thus, we see a $\sim 4\sigma$ discrepancy implying that $\sim$75% of cluster stars fail to produce observable PN. A likely explanation is that cluster stars are so low mass that their progeny fail to climb the AGB, or as PAGB stars, they fail to achieve the temperatures needed to ionize the surrounding nebula before the nebula disperses. The corollary is that there should be no cluster PNe unless those we see are products of unusual evolution, such as in close binaries.

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