CCD Spectrophotometry of Extended PN: Observations at Wendelstein Observatory

Martin M. Roth

Astrophysikalisches Institut Potsdam

Most of the existing flux data on galactic PN is based on measurements with scanners or photoelectric aperture photometers. Also, true global fluxes are not even available for many PNe in lines other than H_β, and one has to rely on line intensities which have been derived from slit spectrometers. For extended, low surface brightness objects all of these instruments are not appropriate to derive reliable fluxes (see e.g. remark on NGC 7293 by O'Dell, this conference). As part of a PhD thesis a dedicated CCD camera for the Wendelstein Observatory 0.8m telescope has been developed (Roth 1990, 1993), optimized for flux-calibrated imaging through narrow-band interference filters with bandpasses down to 8Å FWHM and a thermal control unit for central wavelength tuning. As a test, nebular and central star fluxes have been measured for NGC 2392, NGC 3242, NGC4361, and NGC 6210 in H_β, He II 4686, [O III] 5007, and a continuum passband. The results for these bright objects are in agreement with the best references as compiled from the literature. A detailed comparison shows that the spatial extent of the nebula is now always considered correctly, based on the CCD image information and the curve-of-growth convergence of the surface photometry. The central star photometry is largely improved, in particular for high surface brightness PNe. Another advantage (which however was not important for the test objects here) is the technically easy removal of disturbing field stars within the radius of a faint, extended nebula. The use of very narrow bandwidth, thermally controlled filters proved to be beneficial in substantially reducing the sky and nebular continuum background contribution. From the nebular and central star fluxes, Zanstra temperatures have been derived. The cause of the observed Zanstra discrepancy (which is in accordance with several other determinations for the investigated objects) cannot be attributed to observational uncertainties. From the discussion of *Unified NLTE model atmospheres* (Gabler et al. 1991) and model fits to the central stars of NGC2392, NGC3242, NGC4361 (Méndez et al. 1988), and NGC6210 (McCarthy et al. 1990) the most likely explanation is a combination of two effects: EUV excess over currently predicted central star flux distributions, and leakage of UV photons from the nebula (see also Méndez et al. 1992).

REFERENCES

Gabler, R., Kudritzki, R.P., Méndez, R.H. 1991, A&A 245, 587
McCarthy, J.K., Mould, J.R., Méndez, R.H., Kudritzki, R.P., Husfeld, D., Herrero, A., Groth, H.G. 1990, ApJ 351, 230
Méndez, R.H., Kudritzki, R.P., Herrero, A., Husfeld, D., Groth, H.G. 1988, A&A 190, 113
Méndez, R.H., Kudritzki, R.P., Herrero, A. 1992, A&A 260, 329
Roth, M.M. 1990, in *CCDs in Astronomy*, ASP Conf. Ser., Vol. 8, ed. G.Jacoby, p. 380
Roth, M.M. 1993, Dissertation Ludwig-Maximilians-Universität München