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Interrogating narrow-line regions: Spatially probing metallicity and the radiation field

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Maps of the gas-phase metallicity are presented for four nearby Seyfert galaxies selected from the optical S7 IFU survey, including the (obscured) narrow-line Seyfert 1 galaxy Mrk 573. We also measure the ionisation parameter, the hardness of the ionising continuum “E_{peak}”, and the pressure across the large-scale extended narrow-line regions (ENLRs). These three parameters were constrained simultaneously with the metallicity using the new code NebulaBayes and a grid of photoionisation models. We observe metallicity gradients in a double ionisation cone, an inverse metallicity gradient, and in Mrk 573 we find a uniformly high metallicity. The near-constant ionisation parameters but steeply radially-declining pressures together imply that radiation pressure regulates the ISM density structure on large scales in all of the ENLRs in our sample. The peak of the ionising continuum, E_{peak}, is determined by the nuclear spectrum and the absorbing column between the nucleus and the observed nebula. Our measurements of E_{peak} cannot differentiate between variation in this intrinsic E_{peak} and spectral contamination by shock or HII-region emission. Nevertheless the E_{peak} measurements give insight into the excitation of the ENLRs, and the measurements could potentially be used to diagnose spectral contamination.

Motivation

I am a final-year PhD student. To attend the meeting I need to travel from Canberra, Australia, and the very large distance will result in expensive airfares. For these reasons the financial assistance of the grant would be very welcome.

Grant

yes

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