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Near-Infrared Spectral Energy Distributions of Seyfert Galaxies: Stellar Population, Active Nucleus, and Hot Dust

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We investigate the NIR spectra of 24 Seyfert galaxies observed with the instrument SpeX at the NASA Infrared Telescope Facility (ITRF) in the short cross-dispersed mode. The results of the spectral synthesis fitting procedure are presented and discussed in details by Riffel *et al.* (2009). The approach followed here is based on the STARLIGHT code (see Cid Fernandes *et al.* 2005). The spectral synthesis shows that the NIR continuum of active galaxies can be explained in terms of at least three components: a non-thermal continuum, dust emission, and the stellar population of the circumnuclear region. The study of the stellar population is a critical step in the analysis of the continuum emission of Seyfert galaxies. Moreover, our results are consistent with the predictions of the unified model for AGNs, as the non-thermal continuum and the hot dust emission are present in all Sy 1 sources and only in a small fraction of the Sy 2s. Regarding the stellar population component, our results point to a mean metallicity solar to above solar, if we consider the light-weighted values, while for the mass-weighted mean metallicity our results indicate a sub-solar value. We associate this discrepancy with the well known age–metallicity degeneracy: i.e., for a fixed mass, a high-metallicity stellar population looks cooler — and older — than a low-metallicity population, thus resulting in a higher M/L ratio. Moreover, this is consistent with a galaxy chemical enrichment scenario in which the young population is enriched by the evolution of the early massive stars. In this context, the light-weighted metallicity is more sensitive to the young component, while the mass-weighted metallicity to the old stellar population. The main results can be summarized as follows:

(i) The NIR stellar population synthesis does not reproduce the optical results well.

(ii) Our synthesis shows significant differences between Sy 1 and Sy 2 galaxies. The hot dust component is required to fit the K-band spectra of ∼80% of the Sy 1 galaxies, and only of ∼40% of the Sy 2s. Besides, about 50% of the Sy 2 galaxies require a featureless continuum contribution in excess of 20%, while this fraction increases to about 60% in the Sy 1s. Also, in about 50% of the Sy 2s, the combined featureless continuum and young stellar population components contribute with more than 20%, while this occurs in 90% of the Sy 1. This suggests recent star formation in the central region of our galaxy sample.

(iii) The light at 1.223 μm in the central regions of the galaxies contains a substantial fraction from intermediate-age stellar populations with a mean metallicity near solar. Our analysis confirms that the 1.1 μm CN band can be used as an unambiguous tracer of intermediate-age stellar populations.

References

Cid Fernandes, *et al.* 2005, *MNRAS*, 358, 363
Riffel, R., Pastoriza, M. G., Rodríguez-Ardila, A., & Bonatto, C. 2009 [arXiv:0907.4144]