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Progress Report

REPRESENTATION AND CHARACTERIZATION OF BROAD-LINE AGN SPECTRA BASED ON MANIFOLD LEARNING

I. Jankov[1], D. Ilić[1,2] and A. B. Kovačević[1,3]

[1]*Department of Astronomy, Faculty of Mathematics, University of Belgrade, Studentski trg 16, 11000 Belgrade, Serbia*
[2]*Humboldt Research Fellow, Hamburger Sternwarte, Universität Hamburg, Gojenbergsweg 112, 21029 Hamburg, Germany*
[3]*Fellow of Chinese Academy of Sciences President's International Fellowship Initiative (PIFI) for visiting scientist*

E-mail: isidora_jankov@matf.bg.ac.rs, dilic@matf.bg.ac.rs, andjelka@matf.bg.ac.rs

Considerable progress has been made in the contextualization of broad-line active galactic nuclei (AGN) spectral diversity, providing a basis for meaningful classification and analysis of underlying physical processes based on linear low-dimensional representations of multidimensional parameter space (e.g., Marziani et al. 2018 and references therein, Jankov & Ilić 2020). There is a subset of spectral features, such as the variation in spectral line widths and dust obscuration, exhibiting nonlinearity and thus needing a different approach in order to be taken into account. For this, we use a manifold learning algorithm called Locally Linear Embedding (LLE), which has been previously applied to non-linear data sets (e.g., Vanderplas & Connolly 2009). We further develop our LLE analysis presented in Jankov et al. (2020). In this work, the robust LEE was applied to 19-dimensional space of spectral parameters of low-redshift broad-line AGN extracted from the Sloan Digital Sky Survey Data Release 7 catalogue (Liu et al. 2019). In the next step, we aim to apply this procedure directly to the spectra of the same AGN sample, for a more complete account of their spectral features. Here we present our preliminary findings, aiming to demonstrate the usefulness of the LLE algorithm for visual representation of broad-line AGN properties, and the characterization of distinct sub-populations, which might prove to be of use in future big sky surveys.

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