DEEP LEARNING OF AGN SPECTRAL VARIABILITY

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Abstract

The optical variability has long been a proposed diagnostic of the central engines of active galactic nuclei (AGNs). However, one important problem in monitoring of AGN optical variability is the observational sampling (cadence), since an AGN cannot be observed constantly and periods between observations are not equal. However, the reproduction of AGN light curves is very important for exploring their spectral variability.

Deep learning networks offer a way to model nonlinear behavior based on representations learnt from data and promise new insights into the underlying physical processes. This makes them a potentially great tool for modeling AGN light curves, since complex perturbed interactions of hot gas, dust, and magnetic fields in close proximity to

a super-massive black hole cannot be fully described with the standard statistical model of optical quasar variability.

In this talk, we describe tools for modeling photometric and spectroscopic AGN light curves data. We developed a deep learning engine (DLE) for modeling AGN light curves and extraction of variability properties which has been implemented in Python (https://github.com/LSST-sersag/dle).

The first results of DLEs testing are encouraging and show good potential for future use in the Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST) which will comprise the 10-year photometric observations of southern sky in an optical domain.