Python - a Monte Carlo radiative transfer and ionization code

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Abstract

Python is a multi-purpose, Monte-Carlo radiative transfer and ionization code which has been developed to compute spectra from a wide range of astrophysical objects from cataclysmic variables to quasars. It is able to use a range of analytic wind models and also read in arbitrary gas distributions from hydrodynamic simulations. Populations of photons are generated from user defined radiating objects including accretion disks and stars and transported through the wind. Their effect on the temperature and ionization state of the gas is calculated in a set of ionization cycles. Once the temperature is converged, the transmitted and diffuse spectra are generated for a restricted range of frequencies and viewing angles. We incorporate the macro-atom formulation of Lucy, but also include simpler ionization modes for faster execution where the physical conditions are suitable. Here we present our code and highlight recent successes in modelling different systems including the investigation of broad absorption lines in AGN, thermal wind driving in X-ray binaries and the production of synthetic reverberation maps in AGN.

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