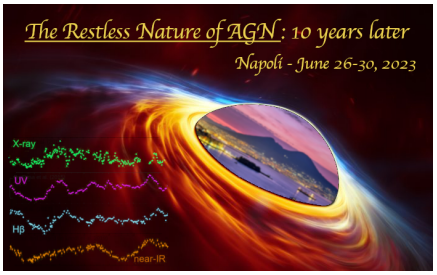

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TEPID: Time Evolving Photolonisation Device for ionised gas, from the optical up to the X-rays

Photoionised gas at all scales is ubiquitously observed in AGNs, from the optical up to the X-rays. Its density, geometry, velocity represent a unique probe of the innermost accretion disc-scale, as well as on the feeding and feedback connecting the AGN to the host environment.

However, current photoionisation codes usually assume time-equilibrium and, thus, cannot self-consistently model the gas response to a time-variable (or transient) ionising source, as for most of the AGNs, and leads to incorrect results when fitting emission and absorption spectra. Moreover, gas density and distance are degenerate at equilibrium and, thus, the outflows energy and mass rates can be determined only with order-of-magnitude uncertainties.

To gain more insights from current observations, especially in the UV (HST) and in the X-rays (XMM-Newton, Chandra), and get ready for the incoming XRISM X-ray telescope, we developed one of the first Time Evolving Photo-Ionisation Device (TEPID), which follows the gas ionisation in response to a (time-varying) luminosity source. The code is highly flexible and can model any astrophysical scenario, from variable AGNs to GRBs and diffuse nebulae. We are now analysing archival XMM-Newton observations of time-variable AGN absorbers, with a particular focus on those that will be observed in the Performance Verification phase of XRISM.

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