SMALL TELESCOPES AND LARGE SURVEYS: THE IMPORTANCE OF MONITORING CAMPAIGNS IN THE STUDY OF AGNs

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Active Galactic Nuclei (AGN) are among the most mysterious and fascinating objects that populate the Universe. In spite of their extremely compact nature, which sees the ultimate source of energy located in a region that is smaller than 1pc across, their power challenges the luminosity of large galaxies, such as the Milky Way. The most widespread interpretation for such a high energy efficiency is the identification of the nuclear power source with the accretion process of matter in the gravitational field of a Super Massive Black Hole (SMBH). The presence of a distribution of dusty molecular gas is responsible for the obscuration of the central energy source, along some specific lines of sight, resulting in a wide variety of observational characteristics.

However, even in the case when a direct line of sight to the central engine is available, the size of the accreting source is so small that we are not able to get resolved images of the nucleus. Therefore, the determination of the nature, the size and the structure of the central engine requires the application of advanced observational techniques.

Basically, it is known that the accretion process results in the emission of a strong and variable continuum of ionizing radiation, which interacts with the surrounding matter, giving raise to the emission of several recombination lines. These spectral features have characteristic profiles, which depend on the dynamics of the line emitting gas. Studying the variability properties of AGN spectra, it was shown that the emission lines actually respond to the light curve of the ionizing continuum with a delay and a behavior that are controlled by the size and structure of the line emitting region. The Reverberation Mapping technique (RM), which reconstructs the continuum and emission line light curves, through regular observations of targets, is able to derive accurate estimates of the source size and kinematical configuration, thus constraining very well the properties of the central SMBH.

Here we report on the contribution brought by small observatories in providing the appropriate coverage for regular target observations. The application of RM to several objects represents our next step in the interpretation of AGN physics. Extending the source monitoring campaigns over long periods of time and on a wide sample of targets is fundamental to improve the accuracy of the method, to investigate the broad band properties of sources detected in other wavelengths, and to provide a reliable calibration framework to understand the role of AGNs throughout the Universe.