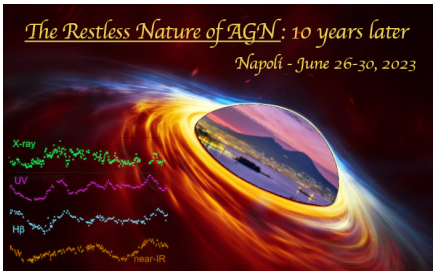

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Unveiling the periodic variability patterns of the multiwavelength light emission from the blazar PG 1553+113

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The characteristic variability of blazars is being since long time explained by relating it to a wide range of possible physical processes, occurring in the accretion disk and/or the jet. The various scenarios include emission spots in the accretion disk revolving around the supermassive black hole, magnetohydrodynamic instabilities in the disk or the jet, shocks traveling along turbulent jets, and relativistic effects due to the jet orientation. In the X-ray band, the background emission generated by the accretion disk seems to outshine any possible additional source of variability, such as the periodicity induced by the presence of a binary black hole in the central engine. The purpose of our work is the search of periodicity in the X-ray, UV and optical light curves of the blazar PG 1553+113 with Swift-XRT data spanning ten years from 2012 to 2022. This source is already known to exhibit periodic variability in the optical and the gamma-rays with a period of 2.2 yr only, we have performed a robust statistical analysis of the light curve. Our results confirm that the PG 1553+113 X-ray emission displays a periodicity shorter by a factor of ˜40% than the gamma-ray one. We also investigated the cross-correlations between the light curves of this source in several bands, in search of possible time delays that could help to discriminate the spatial distribution of the various emitting region.

Primary author(s) : ANIELLO, Tommaso (INAF OAR)

Co-author(s) : ANTONELLI, Lucio Angelo (INAR OAR); TOMBESI, Francesco (Università Roma Tor Vergata); SATURNI, Francesco Gabriele (INAR OAR); MIDDEI, Riccardo (SSDC ASI INAF); VERRECCHIA, Francesco (SSDC ASI INAF); PERRI, Matteo (SSDC ASI INAF); STAMERRA, Antonio (INAF OAR); LAMASTRA , Alessandra (INAF/OAR); PRANDINI, Elisa (UNIPD)

Presenter(s) : ANIELLO, Tommaso (INAF OAR)

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