Oscillatory patterns in the light curves of five long-term monitored type 1 Active Galactic Nuclei

Anđelka Kovačević[1], Luka Č. Popović[1,2] and Dragana Ilić[1]

[1] *Department of Astronomy, Faculty of Mathematics, University of Belgrade, Studentski trg 16, 11000 Belgrade, Serbia*
E-mail: andjelka@matf.bg.ac.rs
[2] *Astronomical Observatory, Volgina 7, 11060 Belgrade, Serbia*

We develop a novel hybrid method in a search for oscillatory behavior of type 1 AGN. Light curves can be of arbitrary length and sampling rate, without assumption of the periodicity range. Hybrid method detects numerically periods, and produce 2D correlation maps of oscillations present in the two light curves.

Using hybrid method we show a novelty in the oscillatory patterns of the all surveys combined light curves of 5 well known type 1 AGN:

i) periodic variations in 3C 390.3, NGC 4151, NGC 5548 and E1821+643

ii) differences in dynamical regimes:
  - binary black hole candidates (NGC 5548 chaotic regime, E1821+643 stable regime);

  - double-peaked Balmer line objects: (3C 390.3 oscillatory pattern rapidly fluctuate in 2D correlation space, Arp 102B no oscillations);

iii) confirmation of physical background of detected oscillations:
    our coupled oscillatory models describe oscillatory behavior in the light curves