

SEARCH FOR NEARBY SUB-PARSEC SUPERMASSIVE BINARY BLACK HOLES USING THE BROAD H β LINES

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ABSTRACT

Sub-parsec supermassive binary black holes (SMBBHs) systems occur as the last stage before the merger of their component black holes, in addition to being important sources of gravitational waves. Unlike their highly-separated counterparts, SMBBH with sub-parsec component separation are difficult to detect. These SMBBHs systems are expected to have activity similar the one exhibited by active galactic nuclei (AGNs), with some peculiarities. In this research, we detected several candidates of sub-parsec SMBBH systems from the peculiarities of the broad H β emission line profile. Using PoSKI SMBBH model, we also estimated several key parameters of the candidates. We used PCA method described by Eracleous et al. (2012) to obtain the possible candidates from SDSS DR16 QSO catalogue. We then fitted the extracted broad H β line with broad H β lines simulated using PoSKI model. We found 270 sub-parsec SMBBH candidates with varying degree of confidence in its fitting. Out of these 270 candidates, we found 24 candidates that should be monitored due to the possibility of mergers in near future. We determined that PoSKI model is capable of simulating the broad H β line of sub-parsec SMBBH. The PoSKI model can also be used to predict the broad H β line to be used for continuous observation.