

Update in the search for close massive binary black holes : a list of new candidates

The evolution of black holes over time remains unclear. Whilst stellar mass black holes form at the end of the lives of massive stars and the formation of supermassive black holes is less clear. The detection of high-mass quasars at redshifts greater than 7 make it difficult to reconcile their origin with stellar mass black hole seeds. Different possibilities are possible to explain their emergence; accretion, mergers or intermediate mass black hole seeds, or a combination of two or three of those scenarios. The space-based gravitational wave observatory LISA will be able to detect the merger of massive binary black holes (MBBHs) giving us constraints on the merging rate and thus the evolutionary paths of supermassive black holes. Prior to LISA, a few dual AGN or MBBHs with kiloparsec separation have been discovered but observational evidence for close sub-parsec separation MBBHs is weak. Such systems are expected to display detectable variability in the optical/UV, due to the accretion flow in the binary. We conducted a systematic search for sub parsec separation MBBHs, looking for sinusoidal variations in optical lightcurves using Catalina Real-Time Transient Survey (CRTS) and Zwicky Transient Facility (ZTF) data, revealing a number of excellent candidates. We present the results of this study here.