

Determining the parameters of binary supermassive black holes

Monday 22 July 2024 16:55 (10 minutes)

A model is proposed for finding the parameters of close binary systems of supermassive black holes based only on observational data in the radio range. The methodology for determining the physical characteristics of the binary systems of supermassive black holes includes conducting harmonic and wavelet analyses, determining the masses of the satellites and their orbital characteristics. It is shown that 3C 273, 3C 454.3, OJ 287, AO 0235+164 and S 0528+134 can be a very massive and close binary system, containing companions with similar masses [1-3].

The main physical characteristics of binary supermassive black holes (SMBHs) located in the central regions of the system are obtained. These data were used to find the masses of the SMBH companions, the parameters of their orbits, the energy reserve of the system, and the lifetime of the object before the SMBHs merger.

The level of gravitational waves on the Earth's surface was determined and the possibility of their detection by International Pulsar Timing Array (IPTA) gravitational wave detectors was considered. Blazar S 0528+134 is the most powerful emitter in the universe, including the range of gravitational waves.

This research was funded by the RSF, grant number 23-22-10032.

1. Vovach A.E., Vovach L.N., Larionov M.G. Most massive double black hole 3C 454.3 and powerful gravitational wave radiation. *Astron. Astrophys.* 2021, 648, A27.
2. Vovach A.E., Vovach L.N., Larionov M.G. A close binary supermassive black hole model for the galaxy 3C 273. *Galaxies* 2023, 11, 96.
3. Vovach A.E., Vovach L.N., Larionov M.G. Electromagnetic and gravitational radiation of blazar OJ 287. *iScience*. 2024. Volume 27, Issue 4, 109427.

Funding request, please specify

Authors: VOLVACH, Alexandr (Radio Astronomy Laboratory); Dr VOLVACH, L.N. (Radio Astronomy and Geodynamics Department of CrAO); Dr LARIONOV, M.G. (Astro Space Center of LPhI)

Presenter: VOLVACH, Alexandr (Radio Astronomy Laboratory)

Session Classification: Binary SMBH