Двойная черная дыра 3C 434.3 и мощное гравитационное волновое излучение
Double black hole 3C 454.3 and powerful gravitational wave radiation

А.Е. Вольвач, Л.Н. Вольвач, М.Г. Ларионов
A. E. Volvach, L. N. Volvach, M. G. Larionov

The supermassive black holes (SMBH) parameters required to determine the power of gravitational waves (GW) radiation include the masses of their components, the semi-major axis of the orbit, its eccentricity, orbital and precession periods, the rotation period, and the value of the percenter motion.

We propose a new method for calculating the parameters of the orbits of double supermassive black holes using only multi-frequency monitoring data in the radio band.

Our results suggest that 3C 454.3 may be the most massive close double systems of SMBHs.

Based on the obtained data, we consider the characteristics of the gravitational radiation of this system, as well as the lifetime before merging, and possible variations in companion orbits.

3C 454.3 is the most powerful source of radiation in the range of the entire spectrum.

Estimates of the level of GWs coming from 3C 454.3 show that 3C 454.3 is currently the most powerful GW emitter.

$$<\frac{dE}{dt_{3C454.3}}>=\frac{32G^4M^2m^2(M+m)\left(1+\frac{73e^2}{24}+\frac{37e^4}{96}\right)}{5c^5\cdot a^5(1-e^2)^{\frac{7}{2}}}\approx 0.9\cdot 10^{48}\frac{erg}{s}.$$

The average value for OJ 287 is less than that obtained for 3C 454.3.

Even taking into account the difference in distance, the 3C 454.3 may provide a greater flux density of GWs on Earth than OJ 287.

Another important difference between 3C 454.3 and OJ287 is that for the last 10 yr, companions of 3C 454.3 have been located in the AD structure, which exerts increased dynamic friction on the system.

The calculated lifetimes of the 3C 454.3 system show that this is a short-lived object in the Universe with a lifetime of 5·104 yr.

To determine changes in the orbit of the companion of 3C454.3 and the possibility of experimental determination of these changes, we calculate the rate of the orbit changes:

$$<\frac{da}{dt}>\approx 64\cdot G^3\cdot M\cdot m\cdot(M+m)\cdot\frac{1+\frac{73e^2}{24}+\frac{37e^4}{96}}{5c^5\cdot a^3}\approx 1.8\cdot 10^3\ \frac{cm}{s}.$$

To determine changes in the orbit of the companion of 3C454.3 and the possibility of experimental determination of these changes, we calculate the rate of the orbit changes:

Due to the constant presence of companions in a dense inhomogeneous AD environment, the role of dynamic friction increases for dynamics of all system. In the first of all that connection with the process of calculate of the GWs level radiation, which increase in that case.

This situation allows us to suggests for an increase in the probability of detecting GWs radiating from 3C 454.3.

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