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The black hole binary model of OJ 287 as witness of the validity of the General Relativity

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A peculiar and controversial phenomenology is the periodicity of AGN. This can be related to the indirect search for close supermassive black holes (SMBHs) at sub-parsec separation. A representative case study with multifrequency radio-optical and X-ray data, for example by XMM-Newton, Kepler, and Swift, is presented; namely the X-ray and gamma-ray BL Lac object OJ 287. This is one of the best monitored blazars since about 20 years, with historical optical data dating back to more than 100 years. The last two observing multifrequency campaigns of 2004-2007, organized as the campaign manager, and of 2015-2016, co-organized, allowed to put some indirect tests of the General Relativity (GR), using calculations with three-body problem theory and Post-Newtonian expansion in strong gravitational fields and the timing and clocking given by the light curves and variability of the observed flux. These tests are made under the, debated, assumption that the driving physical model for OJ 287 is an inspiralling binary SMBH system with masses of the order of $10^{10} M_{\text{sun}}$ and $10^8 M_{\text{sun}}$ and $<0.1\text{pc}$ separation, under the action of low frequency gravitational radiation.

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