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Complex Orbital Dynamics of a Double Neutron Star System Revolving around a Massive Black Hole[1] GRANT REMMEN, California Institute of Technology, KINWAH WU, Mullard Space Science Laboratory, University College London — We investigate the orbital dynamics of hierarchical three-body systems containing a double neutron star system orbiting around a massive black hole. These systems show complex dynamical behavior because of relativistic coupling between orbits of the neutron stars in the double neutron star system and the orbit of the double neutron star system around the black hole. The orbital motion of the neutron stars around each other drives a loop mass current, which gives rise to gravito-magnetism. Generally, gravito-magnetism involves a rotating black hole. The hierarchical three-body system that we consider is an unusual situation in which black hole rotation is not required. Using a gravito-electromagnetic formulation, we calculate the orbital precession and nutation of the double neutron star system. These precession and nutation effects are observable, thus providing probes to the spacetime around black holes as well as tests of gravito-electromagnetism in the framework of general relativity.

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