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Interaction modes of magnetic compact stars with gaseous environment near a supermassive black hole

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We examine the role of a dipole-type magnetic field of a compact (neutron) star for its interaction with the ambient interstellar medium, and the resulting drag as the star orbits near a supermassive black hole. The enhancement of the orbital decay is found to be very small in the Galactic centre (the mini-spiral region of Sgr A*), where the environment density is very low, but it becomes quite important in Active Galactic Nuclei, where a relatively dense accretion disc is present. Different regimes of the mutual interaction occur depending on the magnetic field strength, the ISM density, and the parameters (relative velocity, magnetic moment, rotation period, and compactness) of the star.

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