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The innermost stable circular orbit and its shifts due to conservative forces MARC FAVATA, Caltech/JPL — The innermost stable circular orbit (ISCO) of a black hole spacetime denotes the boundary between the stable circular orbits of a test-mass and those that plunge into the event horizon. For geodesic orbits the location of the ISCO is well known in the Schwarzschild and Kerr spacetimes. If conservative forces act on the test-mass, they will shift the location (and frequency) of the ISCO. For the conservative piece of the gravitational self-force, this shift has been calculated by Barack and Sago. I will discuss a similar shift in the ISCO caused by the spin-curvature coupling force on a spinning test-mass. I will also discuss a particular condition for the ISCO that, although derived from the unmodified post- Newtonian equations of motion, is able to exactly reproduce the Kerr ISCO and the ISCO shift due to a spinning test-mass. This condition also closely approximates the Barack-Sago conservative self-force ISCO shift. It is not clear why an ISCO condition derived from approximate post-Newtonian equations is able to accurately reproduce strong-field results.

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