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Gravitomagnetic Dynamical Friction BENJAMIN CASHEN, MICHAEL KESDEN, JUAN SERVIN, University of Texas at Dallas — As a black hole moves through a field of stars (e.g. a galaxy) with some nonzero velocity, relative to the dispersion of the field, a gravitational wake can build up behind it, acting to slow it down. This gravitational drag force is commonly referred to as dynamical friction, and plays an important role in many galactic processes, such as mergers and cluster formations. We extend the current research by examining its effects on the motion of spinning supermassive black holes. In the weak field, low velocity limit we use a post-Newtonian (PN) expansion of the geodesic equations of motion, up to order $O(v^3/c^3)$, to calculate the coefficients of dynamical friction for a Kerr SBH. We find that the cumulative effect of both scattering and capture by the SBH is a "gravitomagnetic" force, similar in form to the Lorentz force, wich acts perpenduicular to the plane spanned by the black holes' spin and velocity vectors. This acceleration causes the black hole to travel along a helical path, similar in fashion to the movement of a charged particle in a magnetic field. I will discuss the meaning of these results, as well as further steps to be taken to improve our understanding of this new dynamical friction force.

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