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Derivation of the Biot-Savart Law from Coulomb's Law and Implications for Gravity DANIEL ZILE, JAMES OVERDUIN, Towson University — We explore links between classical electromagnetism and general relativity in the low-velocity, weak-field limit. We confirm that it is possible to derive the Biot-Savart law for magnetism from Coulomb's law for electrostatics by moving to a boosted frame and applying the force transformation law from special relativity. We then apply the same transformation to Newton's law of gravitation, obtaining a gravitational analog of the magnetic field with units of spin. This field turns out to be two-thirds of the geodetic precession predicted by general relativity theory, a prediction that has recently been verified experimentally by the Gravity Probe B satellite. We discuss some physical interpretations and implications of this result.

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