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Magnetogenesis through a Relativistic Biermann Effect EVAN MILLER, Dartmouth — In a 2010 Physical Review Letter, Mahajan and Yoshida proposed a relativistic correction to the well-known Biermann Battery. The Biermann Battery allows for the generation of magnetic fields in a plasma fluid from orthogonal gradients in temperature and entropy ($\frac{\partial B}{\partial t} \propto \nabla T \times \nabla \sigma$). The proposed correction would result in an additional term, proportional to the gradient of velocity squared crossed with the gradient of entropy ($\frac{\partial B}{\partial t} \propto \nabla v^2 \times \nabla \sigma$). This new effect can in some cases provide the dominate source of magnetic field growth, even when the fluid is only mildly relativistic. This could in turn help explain the dynamics of certain relativistic plasmas, including modern laser plasmas and astrophysical jets. It is possible it could even provide a primordial source for the seed fields needed to explain the cosmological magnetic fields that appear to permeate most galaxies. In my poster, I will explain the theory underlying this new correction and present simulations demonstrating magnetic field growth in a variety of test cases, performed using both a particle-in-cell code and a fluid model.

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