

Abstract Submitted
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Separating the Spin States of a Free Electron Beam NEIL RIFKIN¹,
University of Connecticut — In 1922 Otto Stern and Walther Gerlach set out to test the spacial quantization of the electron by passing a beam of neutral silver atoms through a transverse magnetic field. The interaction of the two projections of the electron's magnetic moment with the magnetic field resulted in a splitting of the beam. However, for some sixty years it was generally accepted that the spin of free electrons, and thus their magnetic moment, could not be measured with an experiment similar to that of Stern and Gerlach. The reason being that the lorentz force on charged particles is far greater than the force due to the magnetic moment of the electron, thus blurring any desired results. To reduce the lorentz force, the electrons could be passed through a magnetic field whose gradient is in the direction of the electrons' momentum. This longitudinal Stern-Gerlach device, with a superconducting magnet, could polarize the tails of a low energy electron beam.

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