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Dynamics of Photoelectrons in Magnetic Fields CHRISTIAN BRACHER, ALEXANDROS FRAGKOPOULOS, Bard College — Near-threshold photodetachment of negative ions provides a practical means to operate an almost point-like, coherent, monochromatic source of electrons. Due to their charge, the emitted electron matter-waves are easily manipulated by external electromagnetic fields. In our contribution, we present the influence of a homogeneous magnetic field on the probability density and current profiles of the electrons, studied using exact and semiclassical methods. Notwithstanding the simplicity of their classical cyclotron motion, the Lorentz force refracts the electron wave in surprisingly complex ways, giving rise to caustic singularities and an intricate interference superstructure, and causes a remarkable modulation of the photodetachment cross section. We consider two cases: An electron source in a purely magnetic field environment, and electron waves effectively confined to a two-dimensional layer, spreading under the influence of crossed electric and magnetic fields, akin to the Hall configuration.

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