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Time-resolved detection of single-electron interference SIMON GUSTAVSSON, Massachusetts Institute of Technology, MATTHIAS STUDER, ETH Zurich, RENAUD LETURCQ, IEMN-CNRS, France, THOMAS IHN, KLAUS ENSSLIN, ETH Zurich, D. C. DRISCOLL, A. C. GOSSARD, University of California, Santa Barbara — We demonstrate real-time detection of single electron interference in a double quantum dot embedded in an Aharonov-Bohm interferometer, with visibility approaching unity [1]. We use a quantum point contact as a charge detector to perform time-resolved measurements of single-electron tunneling. With increased bias voltage across the quantum point contact a back-action is exerted on the interferometer leading to decoherence. We attribute this to emission of radiation from the quantum point contact, which drives electronic transitions in the quantum dots [2]. Surprisingly, the efficiency of this process depends strongly on external magnetic field, with variations occurring on a small fraction of the magnetic field scale associated with one flux quantum penetrating the ring. The unexpected features demonstrate the complex interplay between radiation, absorption and coherence in mesoscopic systems. [1] S. Gustavsson et al., Nano Lett. 8, 2547 (2008). [2] S. Gustavsson et al., PRL 99, 206804 (2007)

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