Abstract Submitted
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Coherent Electronic Grating Cavity Modes in Corrugated Ultrathin Metal Films YANG LIU, University of Illinois, Urbana-Champaign, TOM MILLER, TAI-CHANG CHIANG, UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN TEAM — Crystal surfaces oriented at a small angle relative to a close packed atomic plane may exhibit a periodic array of atomic steps; such stepped surfaces can serve as a template for growing metal films with a corrugated structure at the nanoscale. The corrugation modulates the electron motion within the film and thus modifies the electronic properties of the system. This work is a study of corrugated films of Ag and Pb using angle-resolved photoemission. A central issue is the degree of electron coherence: are the electrons free to propagate across the steps, thus forming Bloch waves? Or, are the electrons confined by the steps to form localized states? How are the photoemission patterns affected by the corrugation? Our results show that the electronic states in these films are coherent across the steps and can be understood in terms of cavity modes confined by atomic scale diffraction gratings. The photoemission patterns are governed by the blazing condition associated with the diffraction gratings and by quantum interference.

Yang Liu
University of Illinois, Urbana-Champaign

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