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The Anomalous de Haas-van Alphen Effect in InAs/GaSb quantum wells JOHANNES KNOLLE, NIGEL R. COOPER, TCM Cavendish Lab, University of Cambridge, UK — The de Haas-van Alphen effect (dHvAe) describes the periodic oscillation of the magnetisation in a material as a function of inverse applied magnetic field. It forms the basis of a well established procedure for measuring Fermi surface properties and its observation is typically taken as a direct signature of a system being metallic. However, certain insulators can show similar oscillations of the magnetisation from quantisation of the energies of electron states in filled bands. Recently the theory of such an anomalous dHvAe (AdHvAe) has been worked out but so far there is no clear experimental observation. Here, we show that the inverted narrow gap regime of InAs/GaSb quantum wells is an ideal platform for the observation of the AdHvAe. From our microscopic calculations we make quantitative predictions for the relevant magnetic field and temperature regimes, and describe unambiguous experimental signatures.

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