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Spin-Orbit Scattering and Quantum Metallicity in Ultra-Thin Be Films[1] PHILIP ADAMS, YIMIN XIONG, AMAR KARKI, DAVID YOUNG, Louisiana State University — We compare and contrast the low temperature magnetotransport properties of ultra-thin, insulating, Be films with and without spin-orbit scattering (SOS). Beryllium films have very little intrinsic SOS, but by "dusting" them with sub-monolayer coverages of Au, one can introduce a well controlled SOS rate. Pure Be films with sheet resistance $R > R_Q$ exhibit a low-temperature negative magnetoresistance (MR) that saturates to the quantum resistance $R_Q = h/e^2$. This high-field *quantum metal* phase is believed to represent a new ground state of the system. In contrast, the corresponding negative MR in Be/Au films is greatly diminished, suggesting that, in the presence of strong SOS, the quantum metal phase can only be reached at field scales well beyond those typically available in a low temperature laboratory.

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