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Transverse magnetoresistance and size effects of thin gold films: Experiment and theory.[1] RAUL C. MUNOZ, Department of Physics/University of Chile, S. OYARZUN, LPMCN/Universite Lyon-1 CNRS, R. HENRIQUEZ, Department of Physics/Universidad Santa Maria, M.A. SUAREZ, L. MORAGA, Department of Physics/University of Chile, G. KREMER, Bachillerato/Facultad de Ciencias/University of Chile — We report new experimental data regarding the transverse magnetoresistance measured with the electric field **E** oriented perpendicular to the magnetic field **B**, both fields (**E**, **B**) contained within the plane of the film (the MacDonald configuration) performed in a family of gold films of different thickness. The signal at 4 K can be univocally attributed to electron-surface scattering. Transport measurements were performed at low temperatures T ($4K \leq T \leq 50K$) under magnetic field strengths B ($1.5\ T \leq B \leq 9\ T$). The magnetoresistance signal exhibits a marked thickness dependence, and its curvature as a function of magnetic field B varies with film thickness. We also present a new theoretical description based upon a solution of Boltzmann Transport Equation [MacDonald D. C. K. and Sarginson K., 1950 *Proc. Roy. Soc. (London)* **A 203** 223], computed using the method of characteristics proposed by Chambers [Chambers R. G., 1950 *Proc. Roy. Soc. (London)* **A 202** 378]. The theoretical description of the magnetic field dependence of the magnetoresistance requires a Hall field that varies with the thickness of the film; this Hall field is tuned to reproduce the experimental data.

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