UNIVERSITY OF CAMBRIDGE

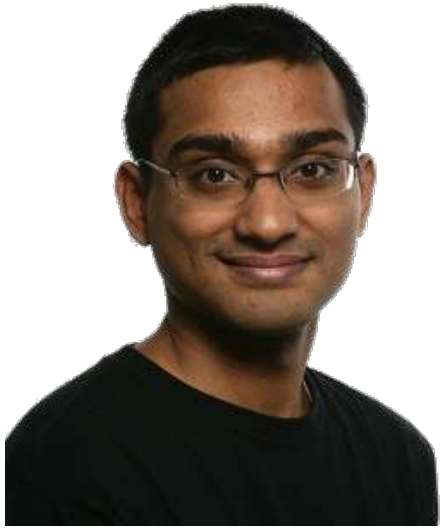
Non-equilibrium magneto-resistance of GeAu

Gareth Conduit
James Dann
Vijay Narayan

Theory of Condensed Matter & Semiconductor Physics

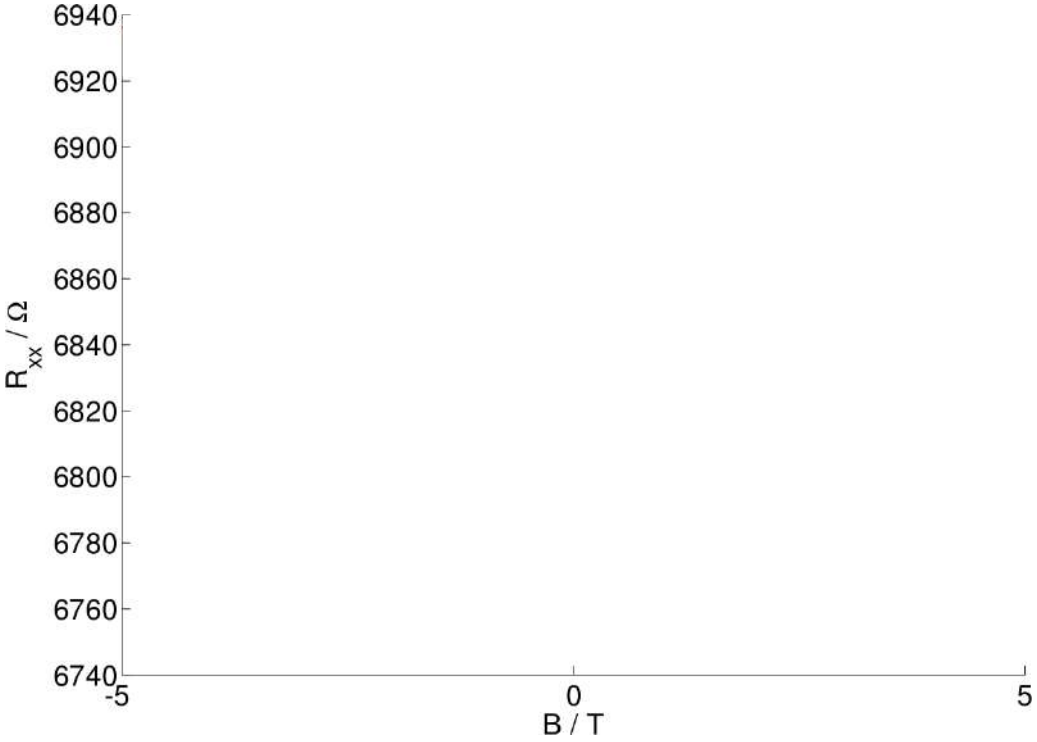
Experimental team

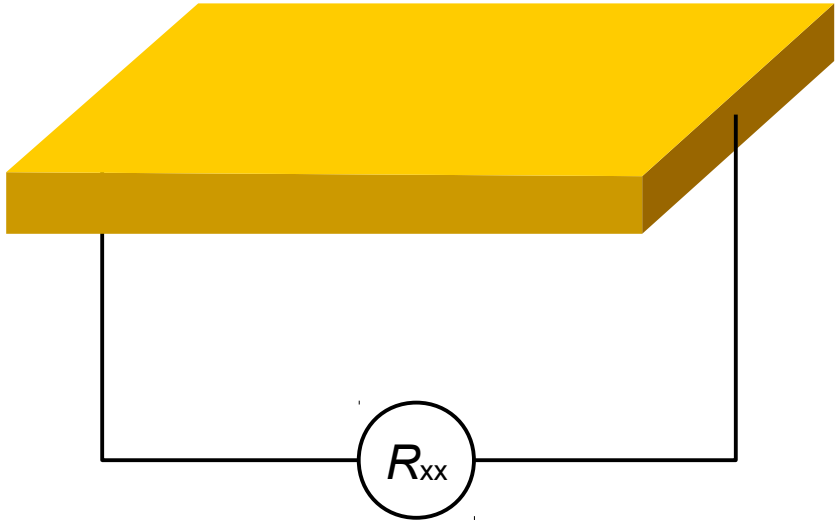
James Dann



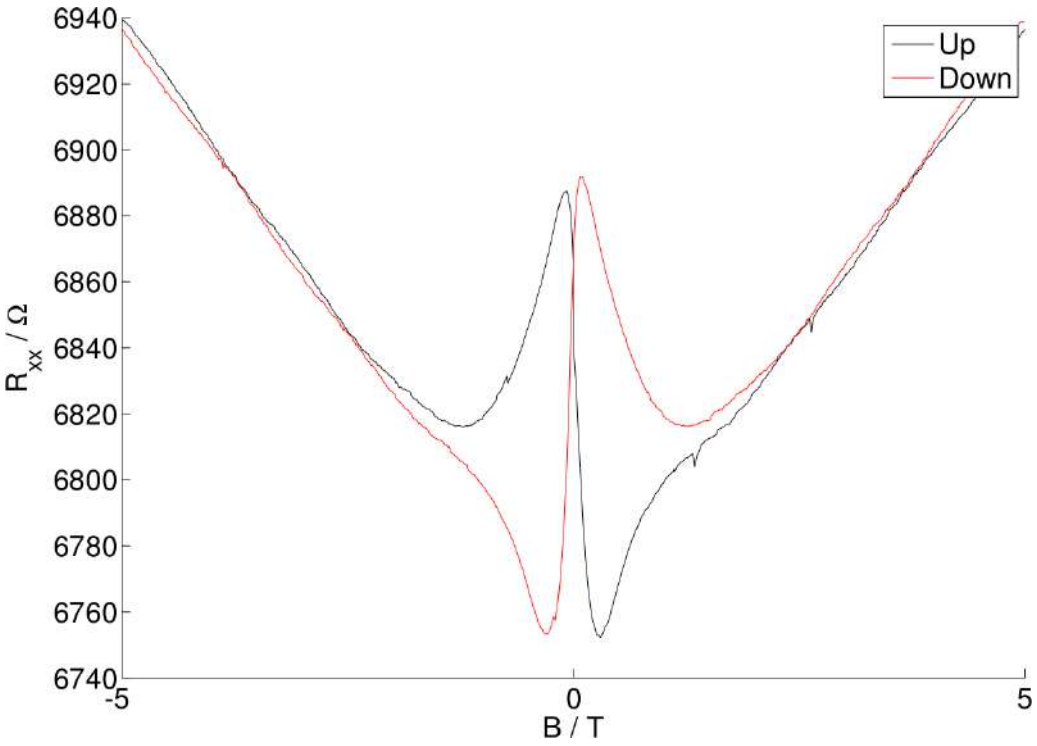
Dr Vijay Narayan

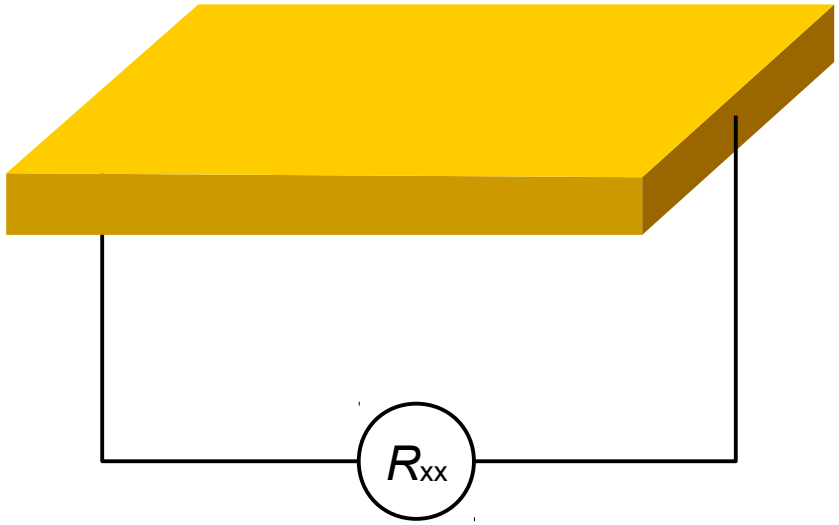
Setup: GeAu


6940
6920
6900
6880
6860
6840
6820
6800
6780
6760
6740
R_{xx} / Ω
-5
0
5
B / T

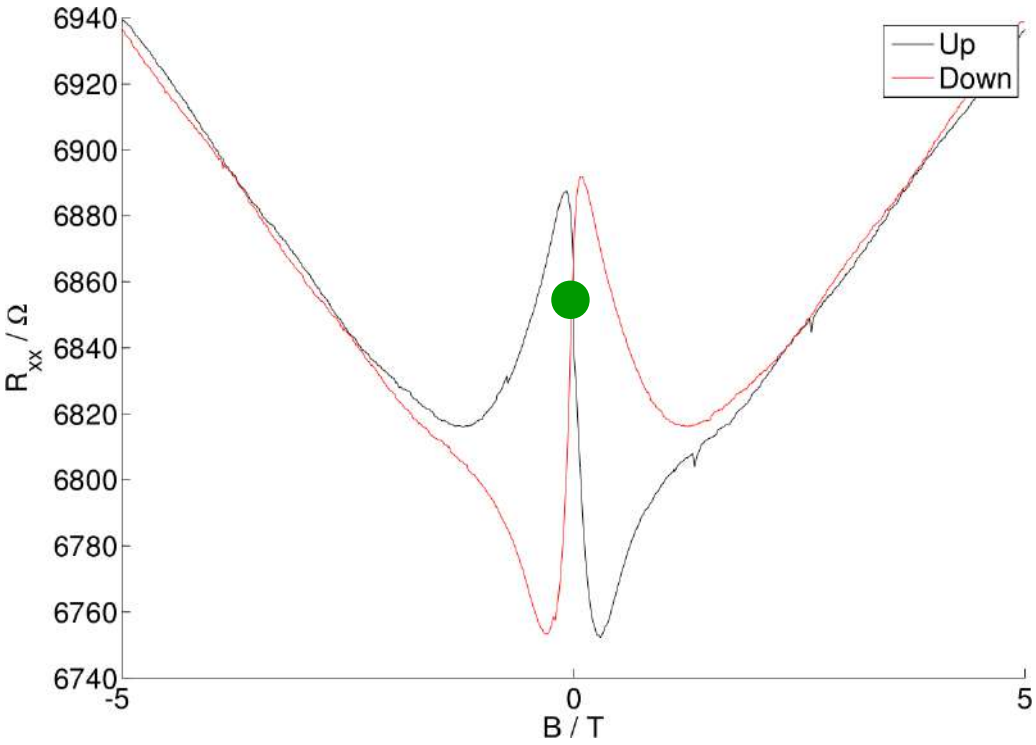

R_{xx}

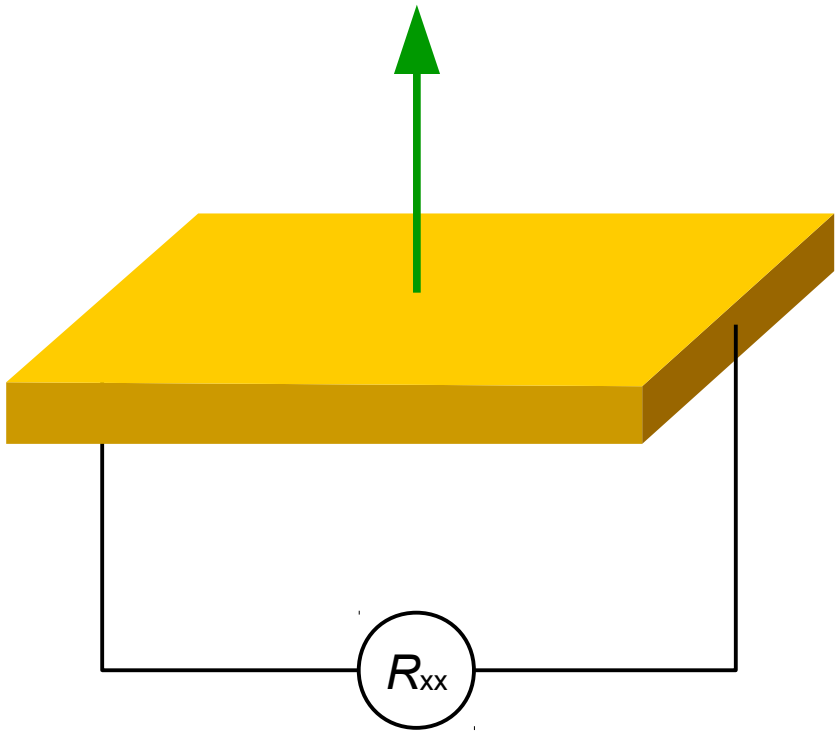
Apply a magnetic field



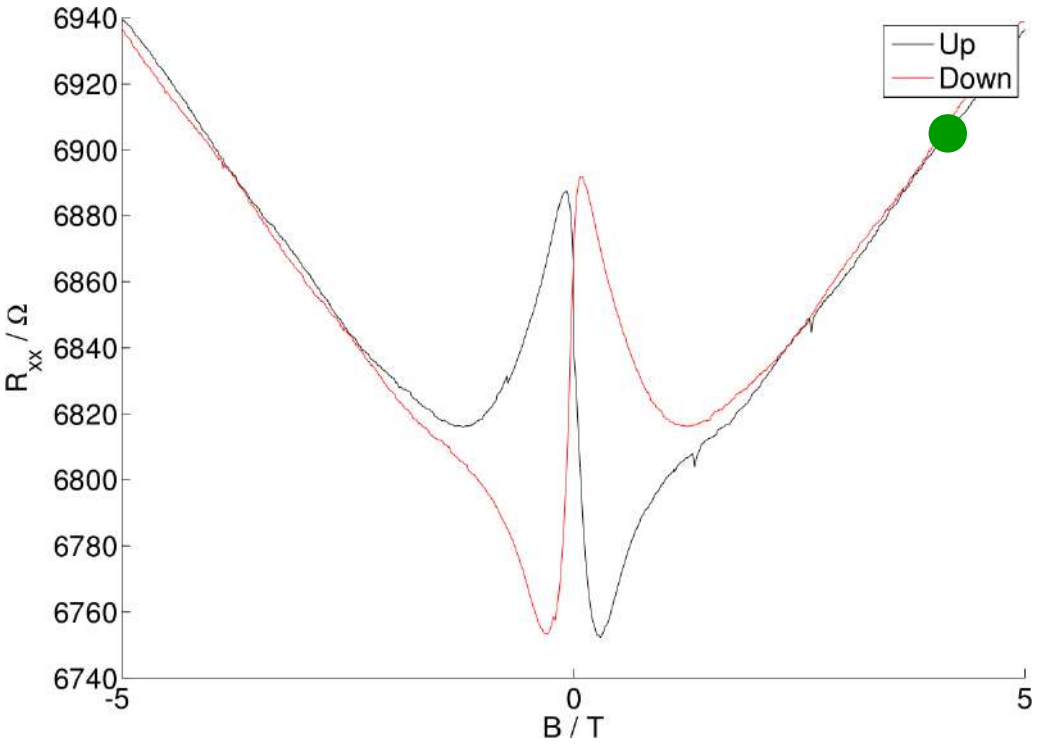


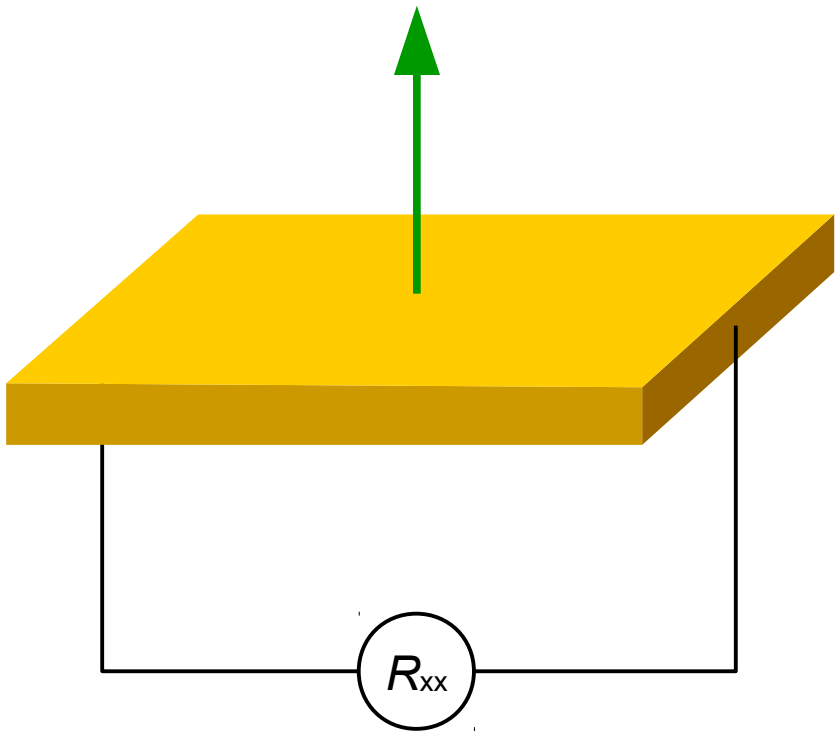
Increase magnetic field



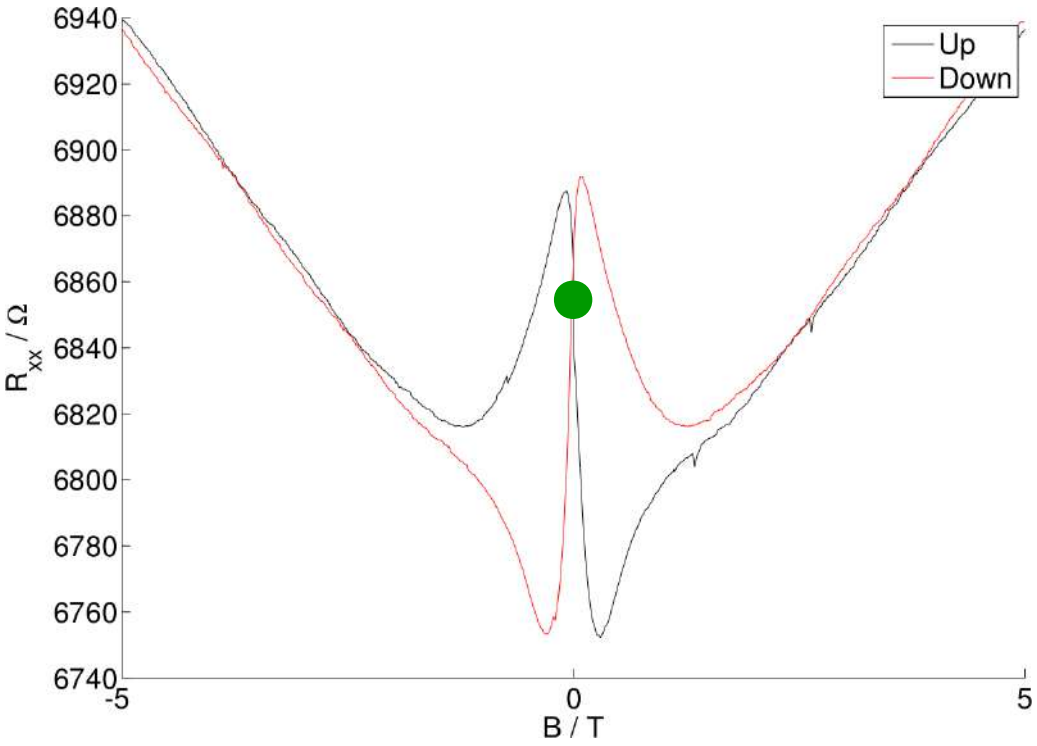


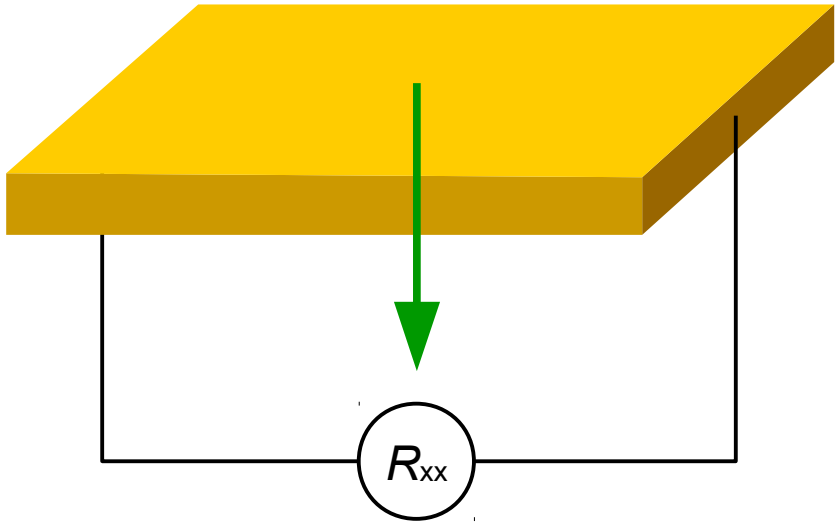
Decrease magnetic field



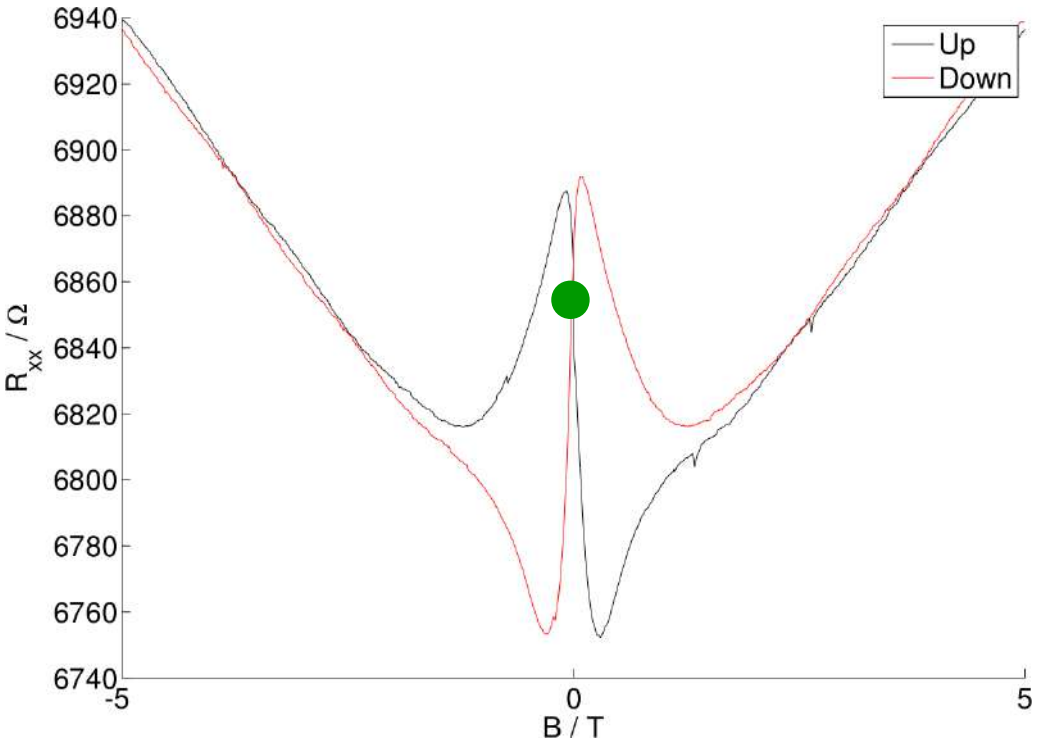


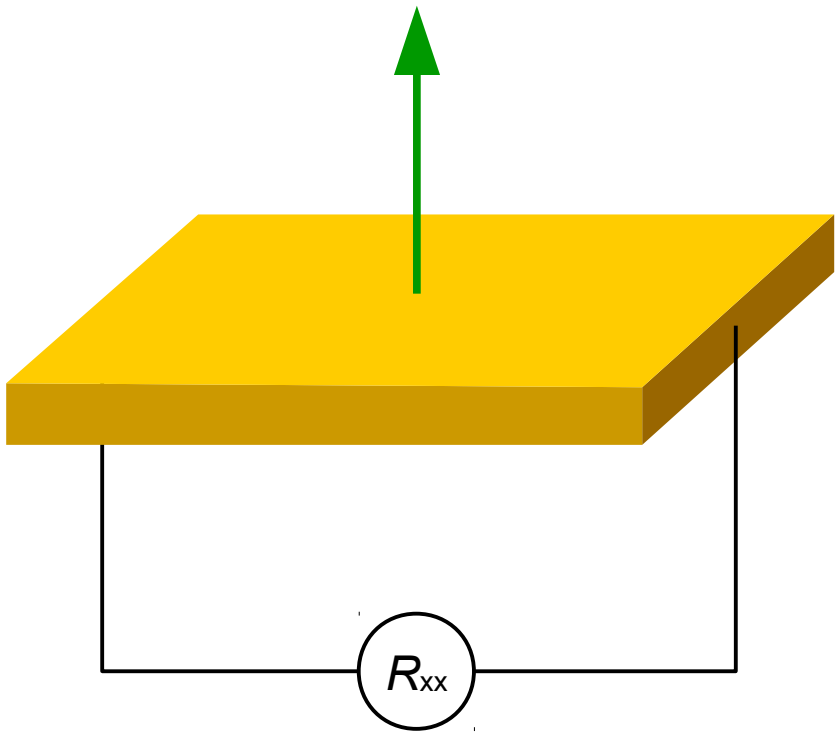
Negative magnetic field



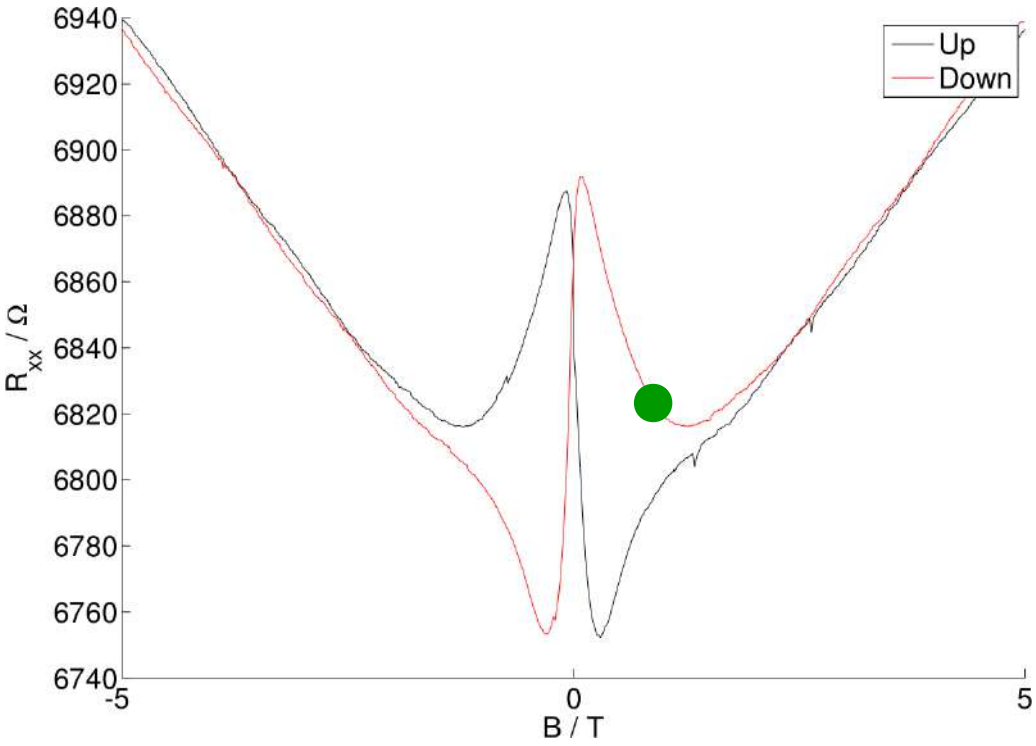


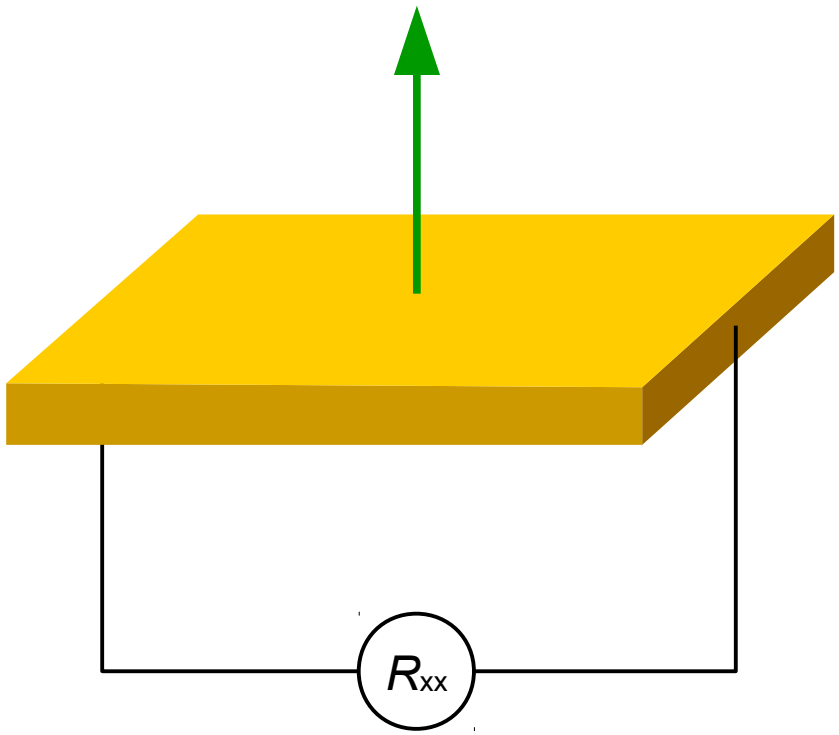
Small increasing magnetic field



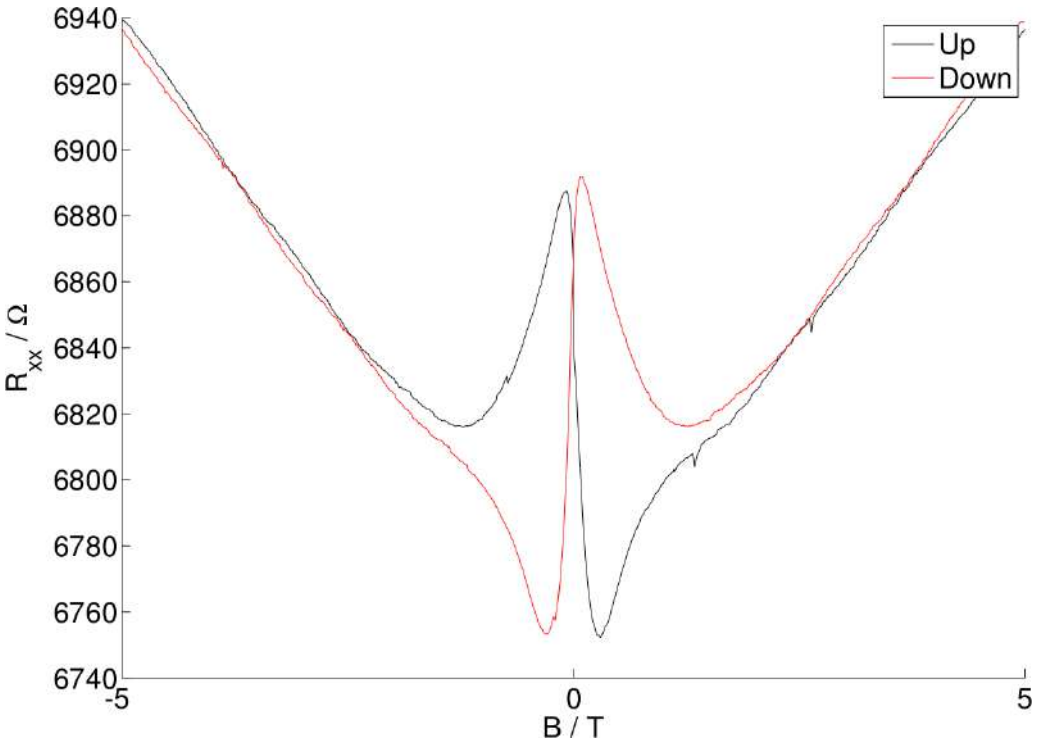


Small decreasing magnetic field





Summary of observations

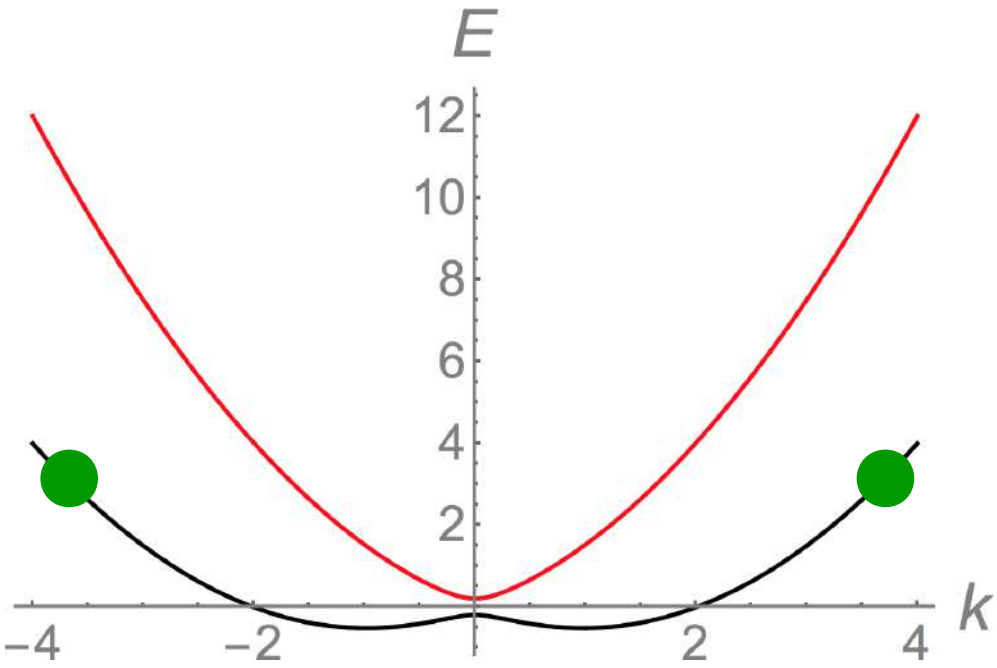


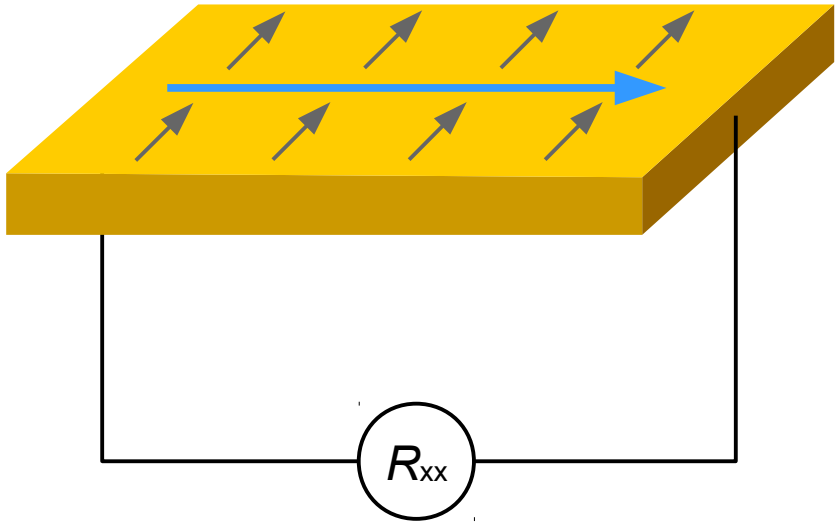
GeAu displays hysteresis

Depends on *B* and d*B*/d*t*

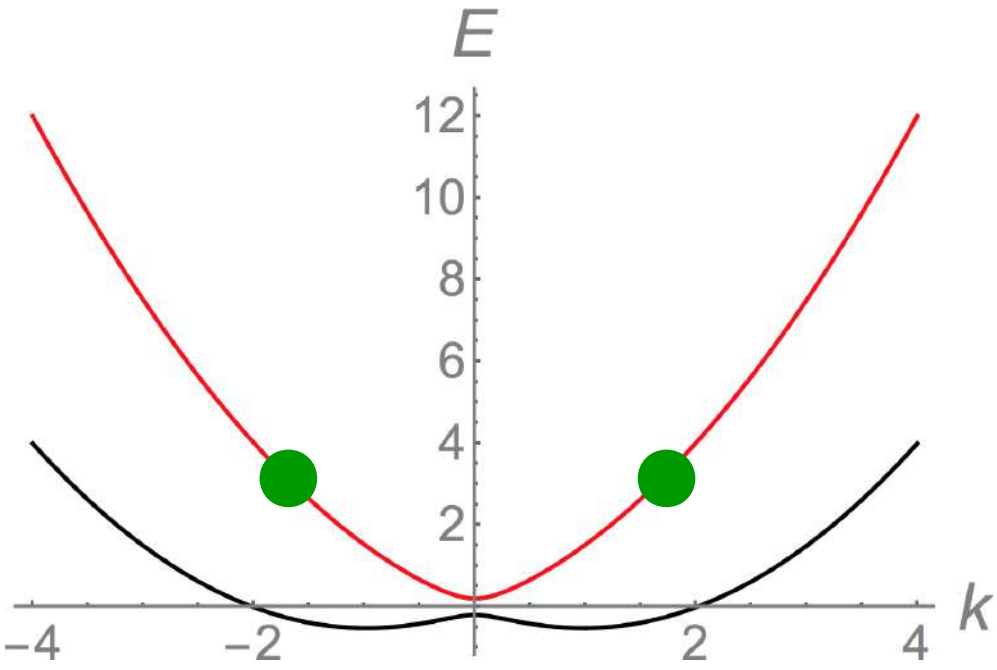
Antisymmetric around *B*=0

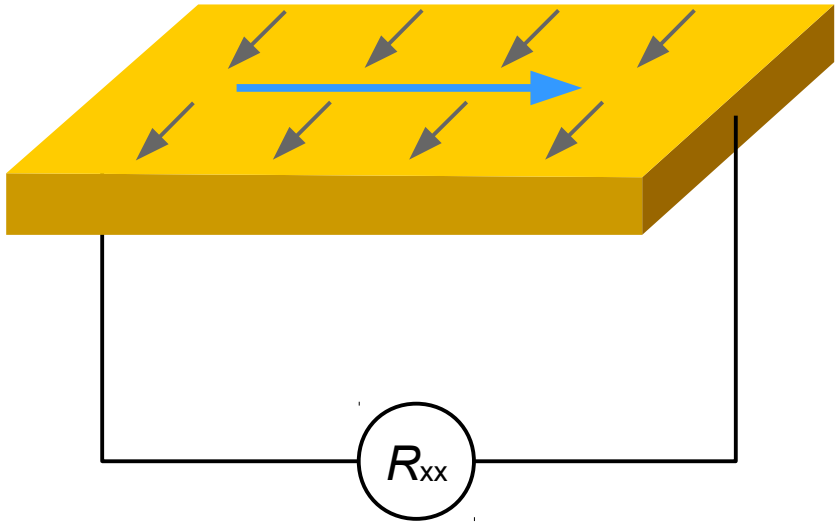
Spin orbit physics: Edelstein effect



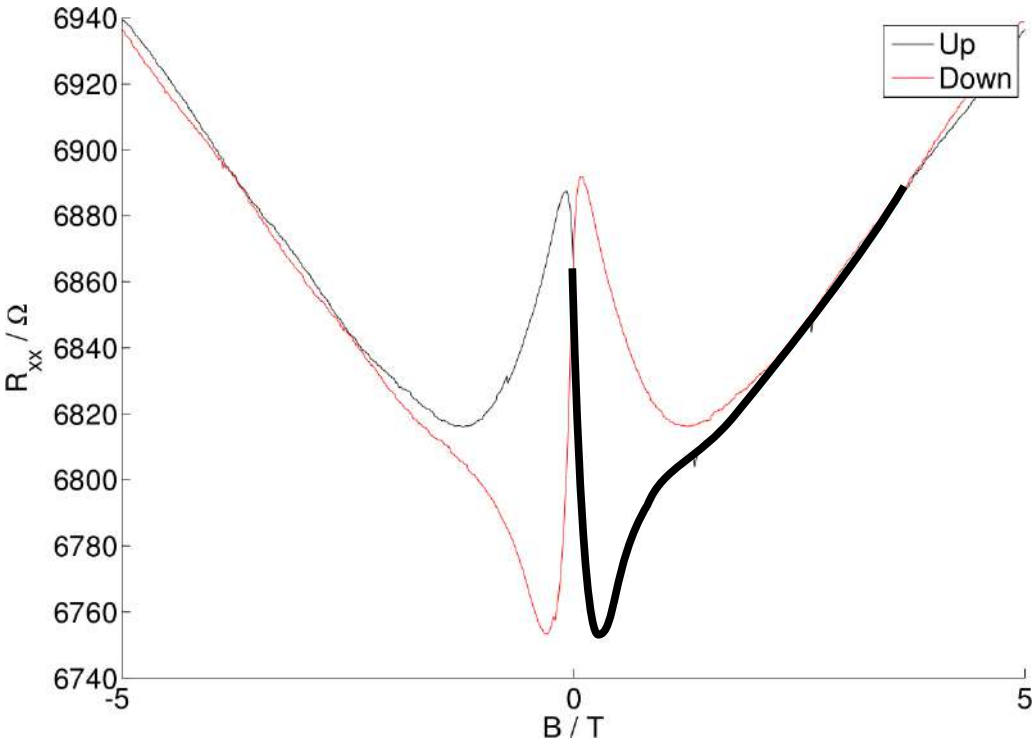


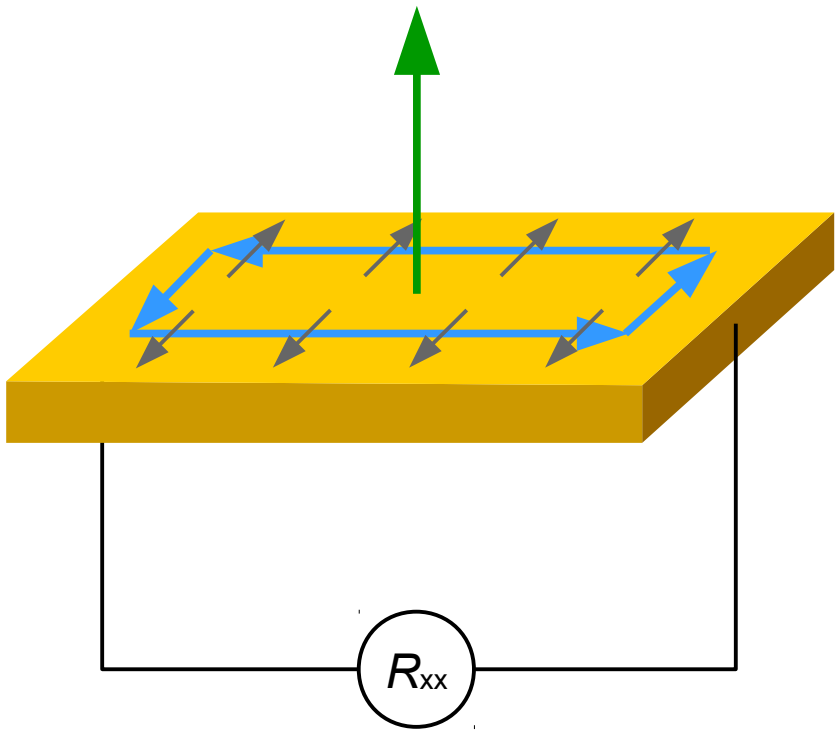
Spin orbit physics: Edelstein effect



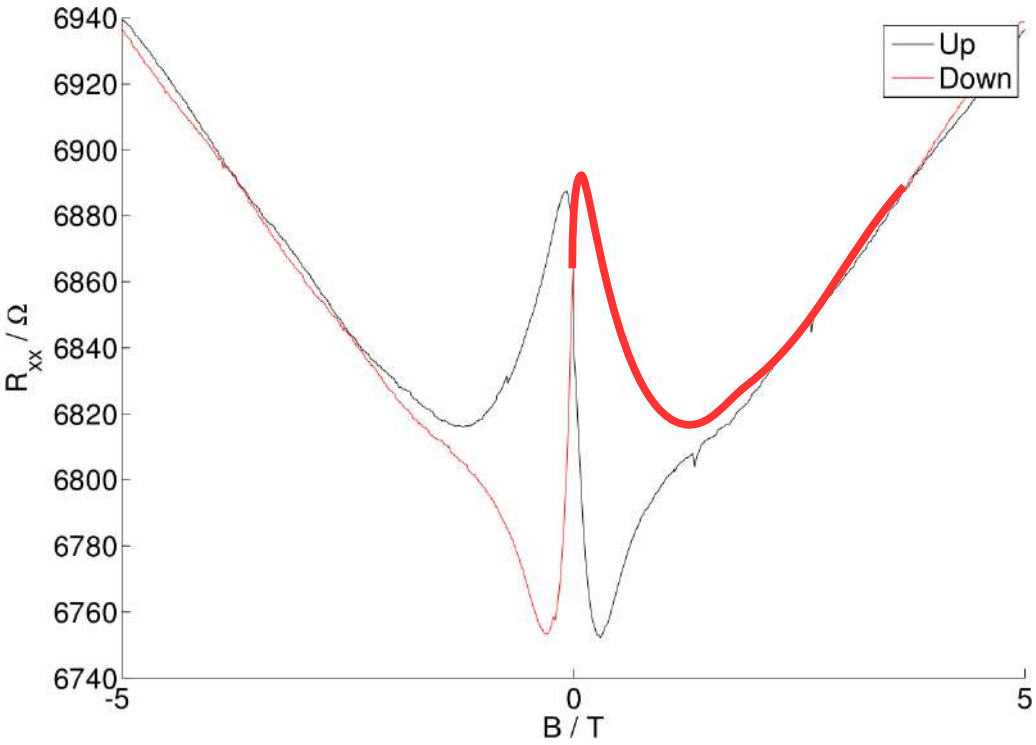


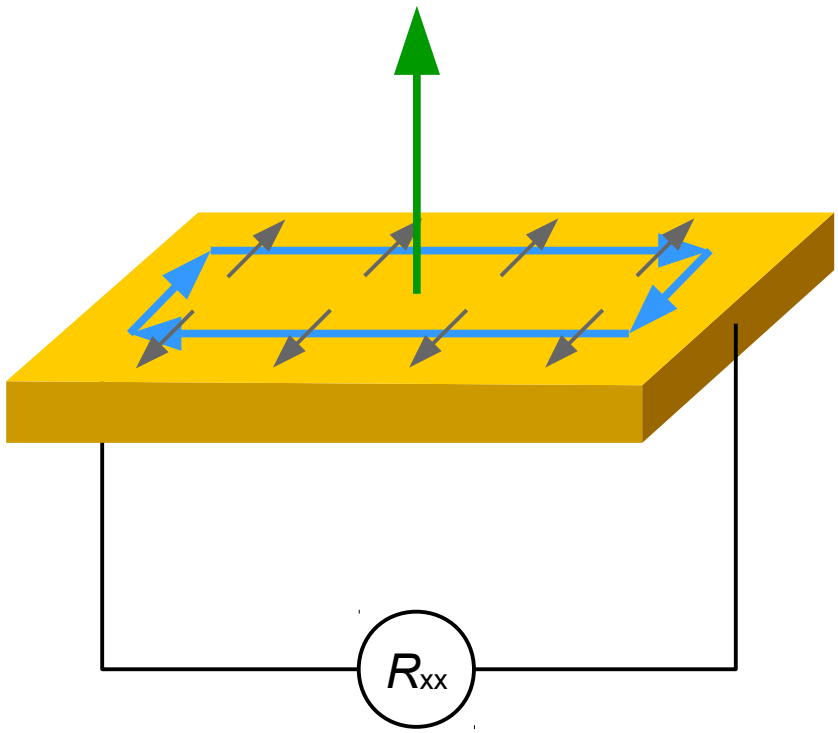
Increasing *B* induces eddy currents



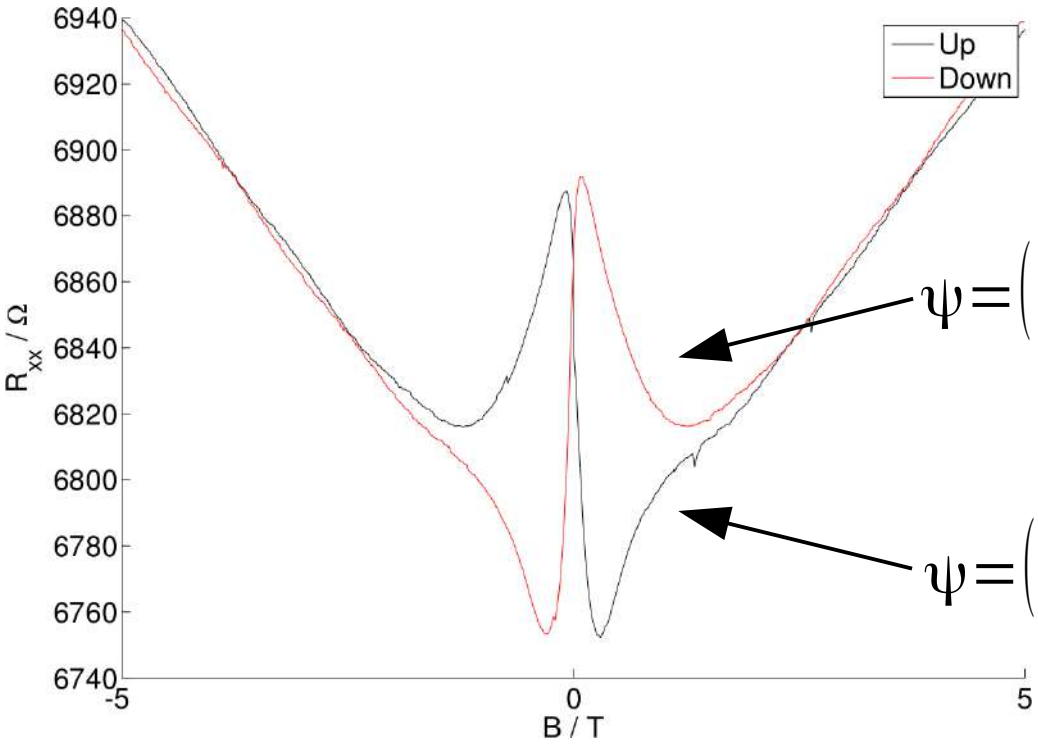


Decreasing *B* induces eddy currents





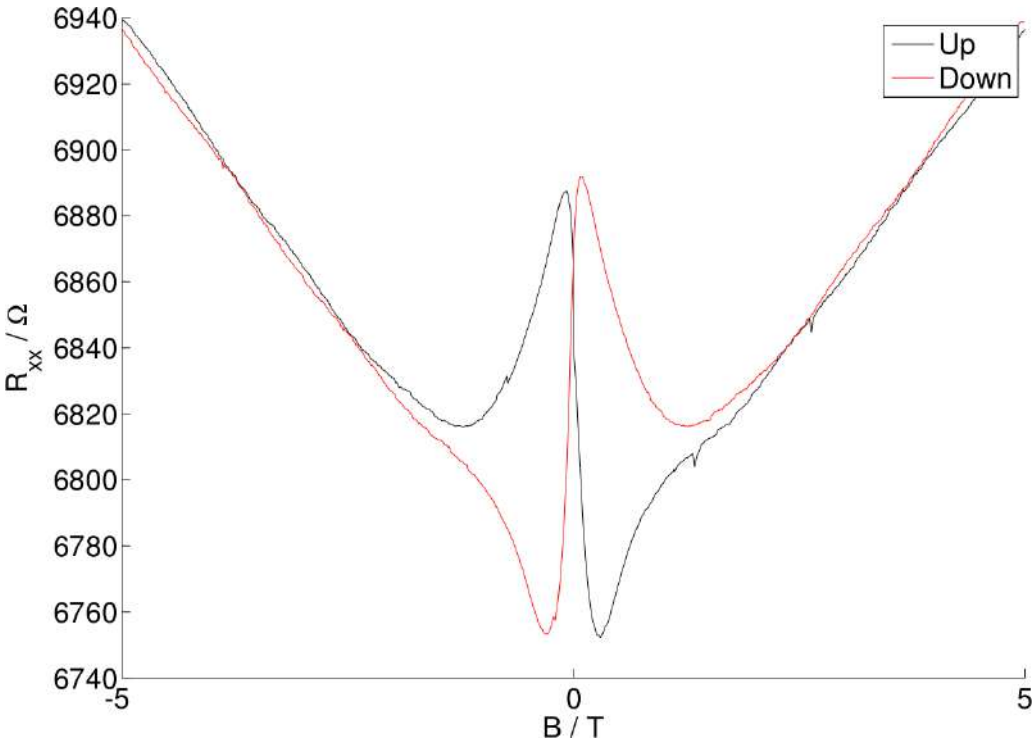
Spin orbit physics: flipping the sign of *B*



$$\psi = \left(\sqrt{B^2 + \gamma^2 \left(k_x^2 + k_y^2 \right)} + B, \gamma \left(k_x - \mathrm{i} k_y \right) \right)$$

$$\psi = \left(\sqrt{B^2 + \gamma^2 \left(k_x^2 + k_y^2 \right)} - B, \gamma \left(k_x - \mathrm{i} k_y \right) \right)$$

Summary



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Driven by spin-orbit physics and eddy currents