Kondo Effect & Its Breakdown: Interplay of fluctuations in zero dimension

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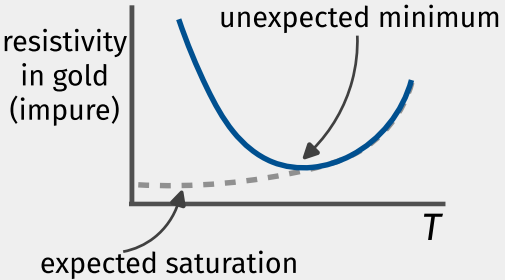
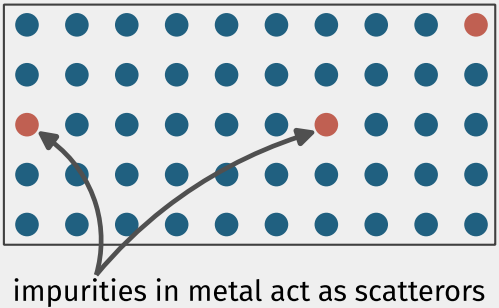
Introducing the Kondo effect

Where it all began

What is the Kondo effect?

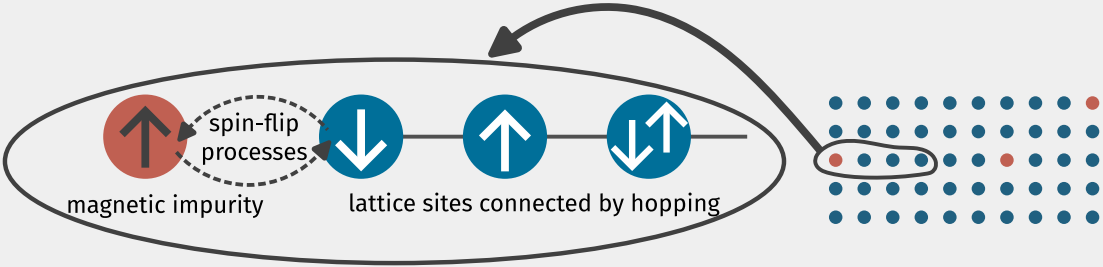
- metal resistivity is expected to decrease monotonically with temperature: $\rho \sim T^n$
- metals with magnetic impurities show an anomalous resistivity minimum





de Haas et al. 1934.

How to explain the resistivity minimum?



The single-channel Kondo problem

Anatomy of the Kondo cloud

Distorting the Kondo singlet

The multi-channel Kondo Problem

How to destroy the Kondo cloud

Effect of local interactions in the bath