Coherence and phase-sensitive measurements in a quantum-dot interferometer experiment.

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Phase measurement in a quantum dot via a double-sh	

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Phase evolution in a Kondo-correlated system

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Small Quantum Dots

Kondo Effect and Phase Measurements in Small Quantum Dots
The Kondo Effect and Phase Measurements in Small Quantum Dots

One may find

\[ |A^{00}(\nu)\rangle = |A^{00}(\nu)\rangle \cdot e^{-i\phi} \]

If \( A^{00} = A^{00}(\nu) \),

\[ \frac{\partial \phi}{\partial x} = \Theta \]

\[ \frac{\partial \Phi}{\partial y} = \Theta \]

\[ J_{AB} \sim \overline{A_{e}e^{-i\Theta}} \]

\[ J_{AB} = |(A_{e}e^{-i\Theta})^{2} + J_{AB}|^{2} \]

\[ = \int |A_{e}e^{-i\Theta} + A_{ee}|^{2} \]
Dr. Peter Silvestrov, ITP, Leiden (ITP Nanoscience 11-19-01) Kondo Effect and Phase Measurements in Small Quantum Dots

W. van Veen et al. 2000

Kondo: E xperiments with DD-5

Nature 1998

D. Geshkenbein-Gordon et al.

- Why are the peaks so high?
- Why are the peaks so narrow?
- Why do we see sets of peaks?
Kondo Effect and Phase Measurements in Small Quantum Dots

1. The Kondo effect is not an answer.
2. Anderson Impurity

2. \( \pi/2 \neq \pi/2 \)
   
   The experiment is surprising about

1. Strong sensitivity of

Figure 2
Kondo Effect and Phase Measurements in Small Quantum Dots

\[ H = \sum \left( g \frac{\Delta}{2} + V_{\text{on-site}} \right) \]

Kondo Hamiltonian

\[ H = \sum \left( \frac{\Delta}{2} C_{s} + \frac{\Delta}{2} C_{s}^\dagger \right) \]

Anderson Impurity Model

\[ \Delta \propto R \sqrt{A} A_{0} \]

Experimental AB effect measured in this experiment.
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\[ G = \frac{n}{2} \left( \frac{4\pi}{h} \right) \left[ \frac{1}{\nu^2 + 6\nu} \right] \]

\[ \text{Phase for } S = \frac{1}{2} \]

\[ (\nu)^2 \approx \nu_0 \]

\[ \frac{G}{G(T)} = \frac{1}{T} \]

\[ \frac{1}{\nu_0} = T \sqrt{\frac{1}{d} \frac{1}{\mu} \frac{N}{A} \left( \frac{V_0 - \nu_0}{\nu_0} \right)} \]
Figure 3
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FIG. 2. X 2D plot of drain current as a function of $V^p$. 

The data is plotted as a function of the phase ($\Phi$) and the magnetic field ($B$). The phase is shown on the left axis, and the magnetic field on the right axis. The plot shows oscillations in the current as a function of the phase, with minima and maxima indicating the influence of the Kondo effect.
$\Delta E = 0$

$T (E) = 0$

- $k \theta$

Phase factor

Single amplitude

$G \propto k A$

$S = 0$
3. $S = 0$ - Adiabatic

+π phase change

- $\frac{\pi}{2}$ phase change

2. $S = 1$ - Seno - antiferromagnetic

1. $S = \frac{1}{2}$ - Simpe exchange

Conclusion: $S$