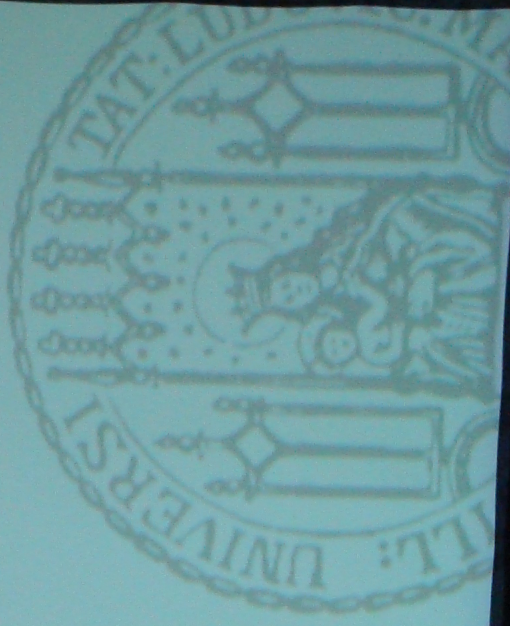
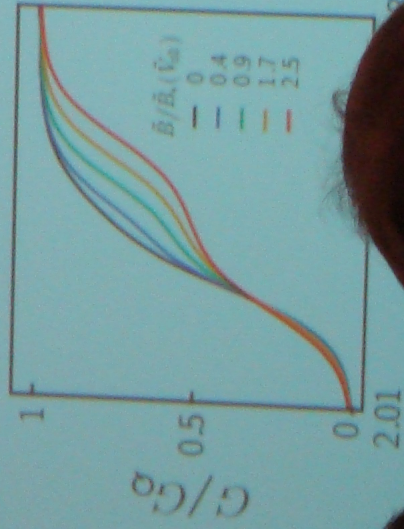
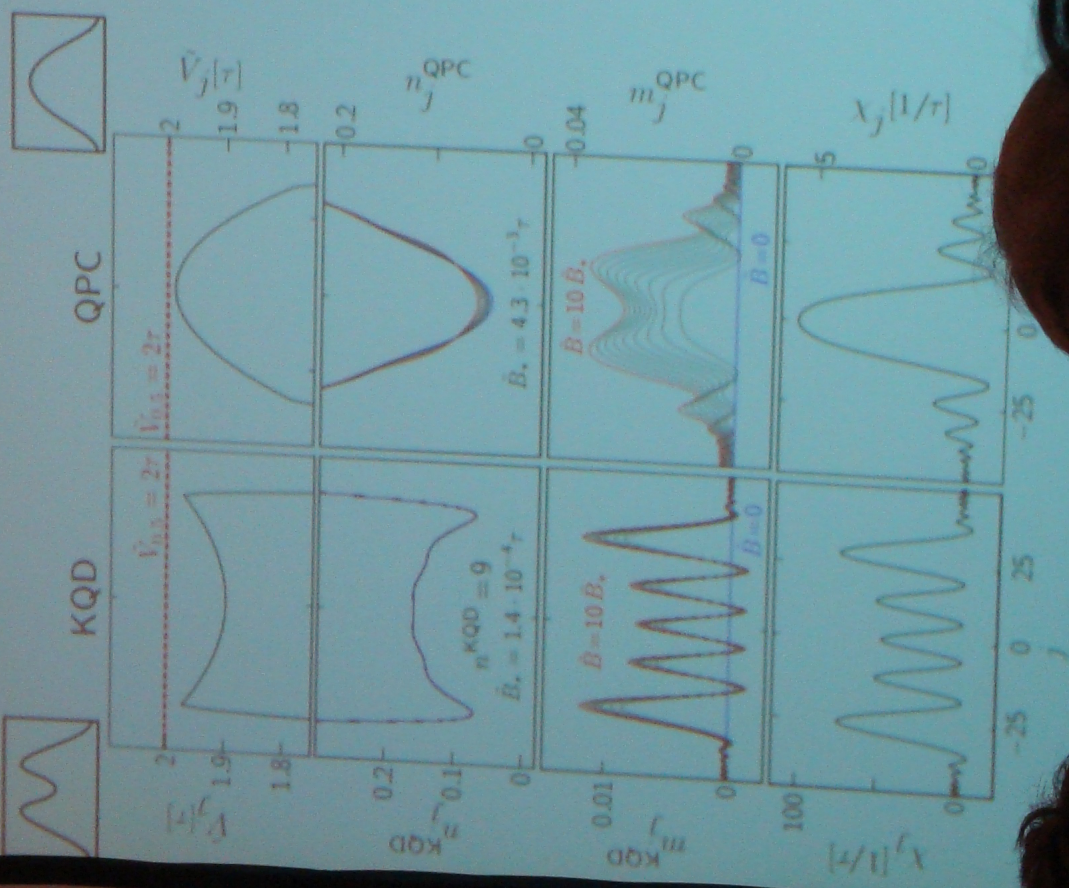


Microscopic Theory for the 0.7 Anomaly in Quantum Point Contacts the Role of Geometry- and Interaction-Enhanced Spin-Susceptibility

Jan Heyder, Florian Bauer, Enrico Schubert, David Borowski, Daniela Taubert,
Werner Wegscheider, Jan von Delft, Stefan Ludwig



local properties - KQD vs. QPC



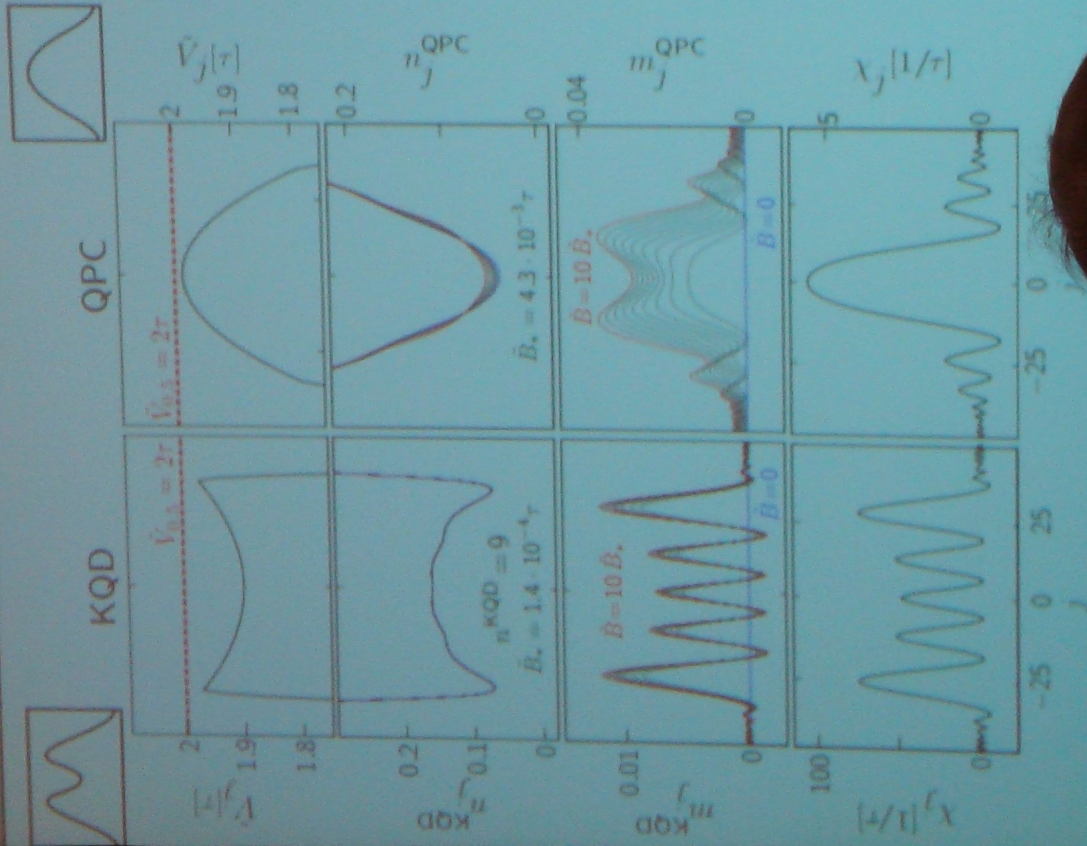
KQD

- local density shows maximum
- localized state polarized by B
=> magnetization saturates
- interaction-enhanced spin-susceptibility

QPC

- local density shows minimum
- ↑ - density flows into CCR
- ↓ - density flows out of CCR

local properties - KQD vs. QPC



KQD

- local density shows maximum
- localized state polarized by B
=> magnetization saturates
- interaction-enhanced spin-susceptibility

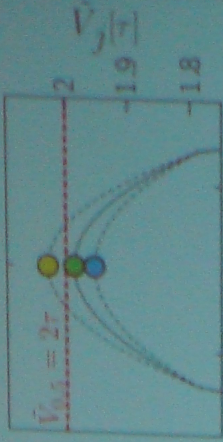
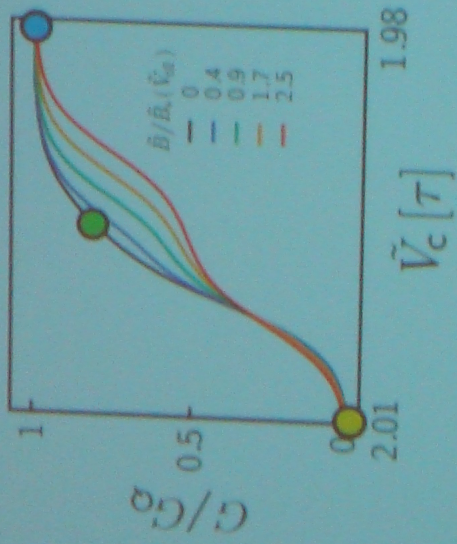
QPC

- local density shows minimum
- \uparrow - density flows into CCR
- \downarrow - density flows out of CCR
- interaction-enhanced spin-susceptibility

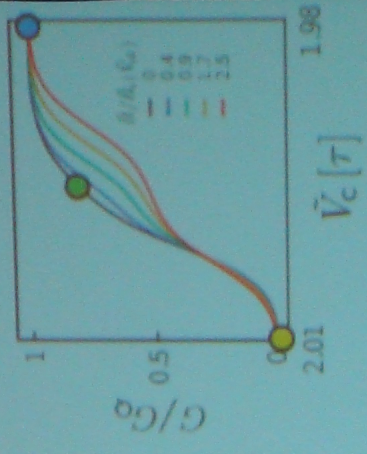
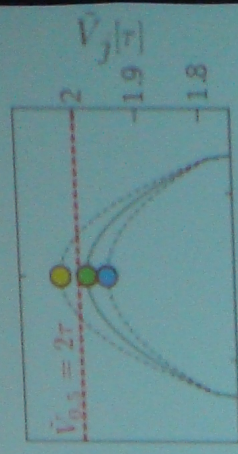
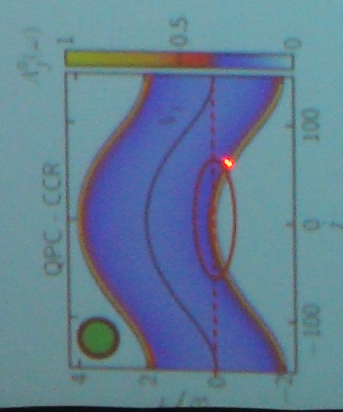
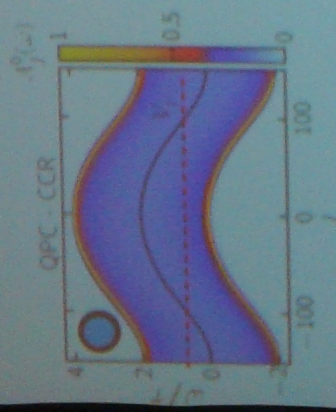
$$B \ll B_* : \text{KQD} \approx \text{QPC}$$

$$B \gg B_* : \text{KQD} \neq \text{QPC}$$

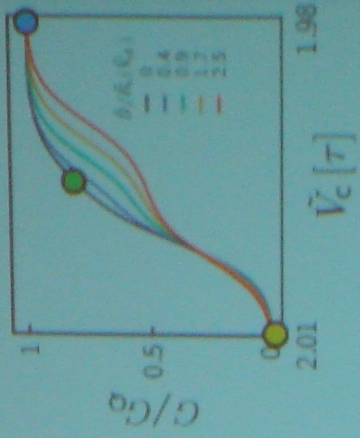
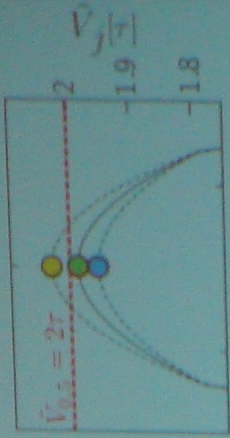
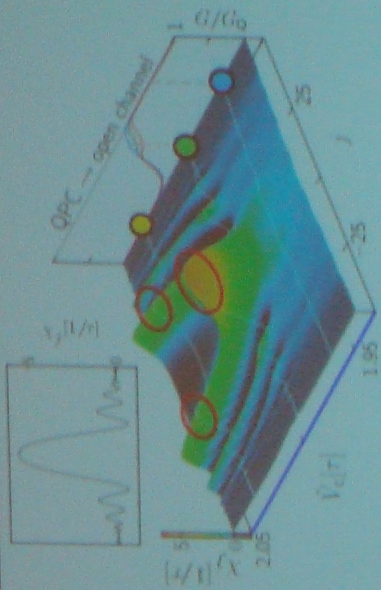
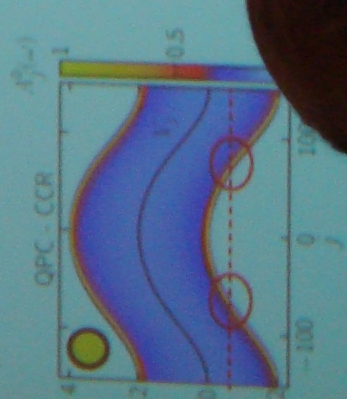
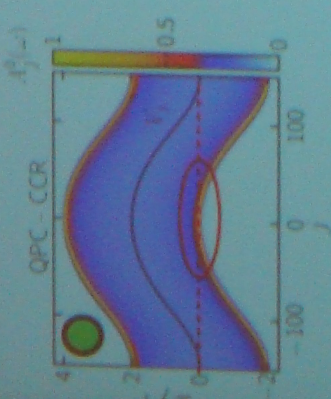
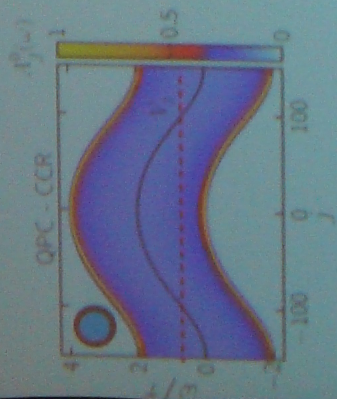
DOS and spin-susceptibility: QPC



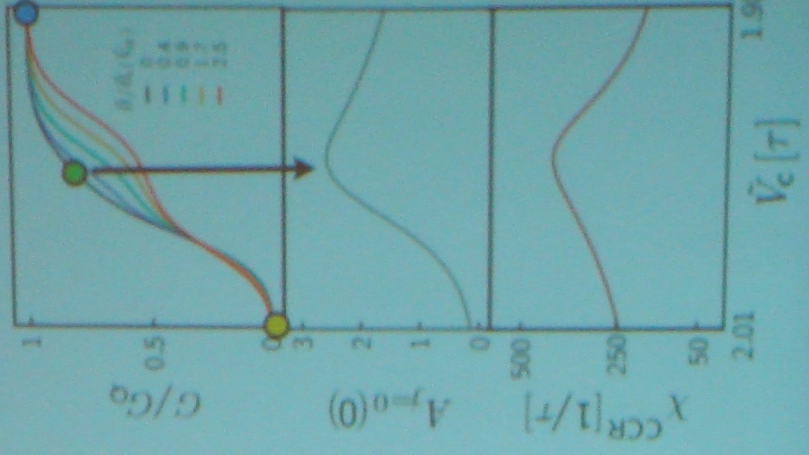
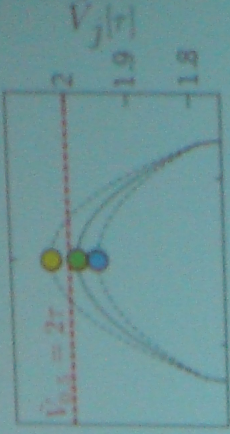
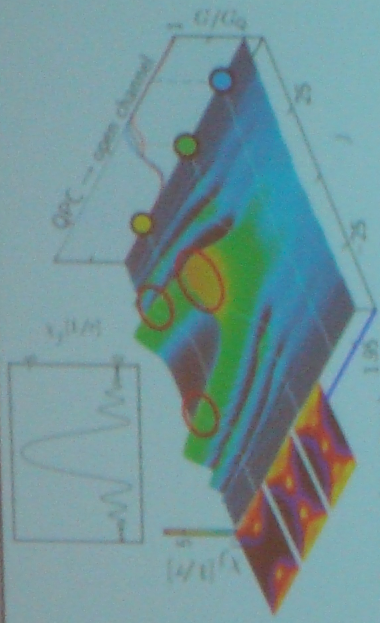
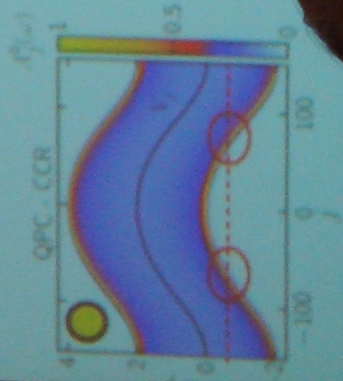
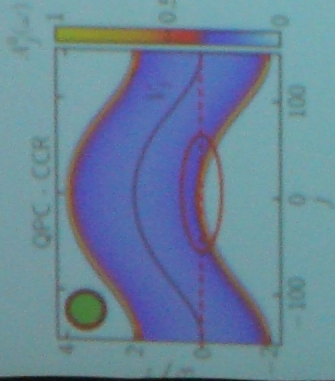
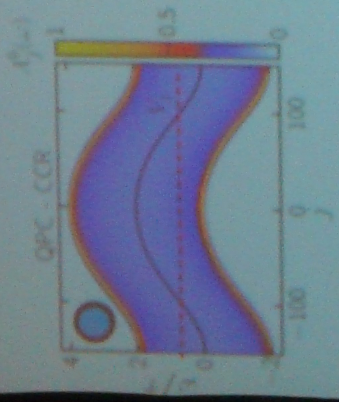
DOS and spin-susceptibility: QPC



DOS and spin-susceptibility: QPC



DOS and spin-susceptibility: QPC

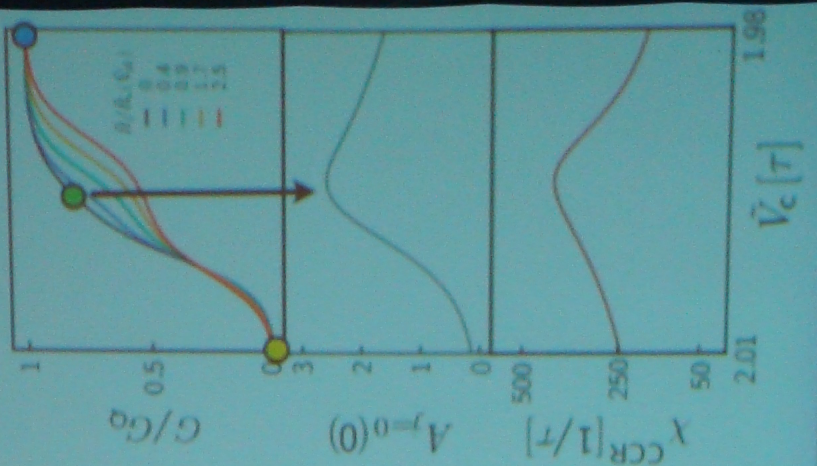
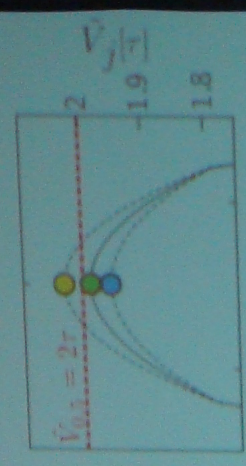
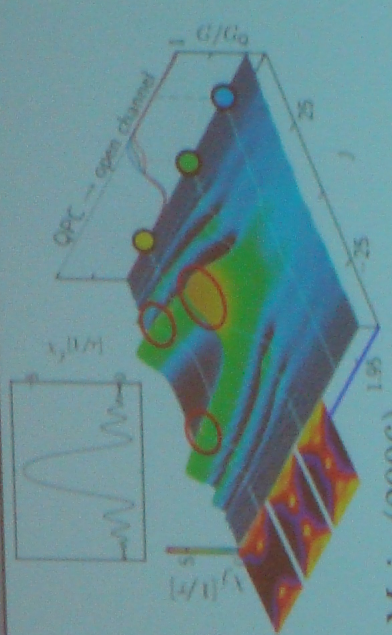
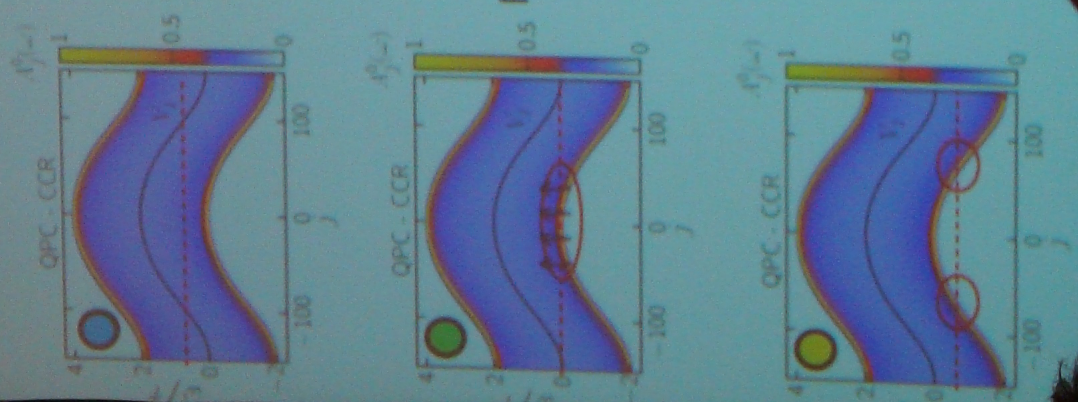


Rejec, Meir (2006)

High density of states at the fermi energy leads to

- high spin-susceptibility
- high magnetization at finite B

DOS and spin-susceptibility: QPC

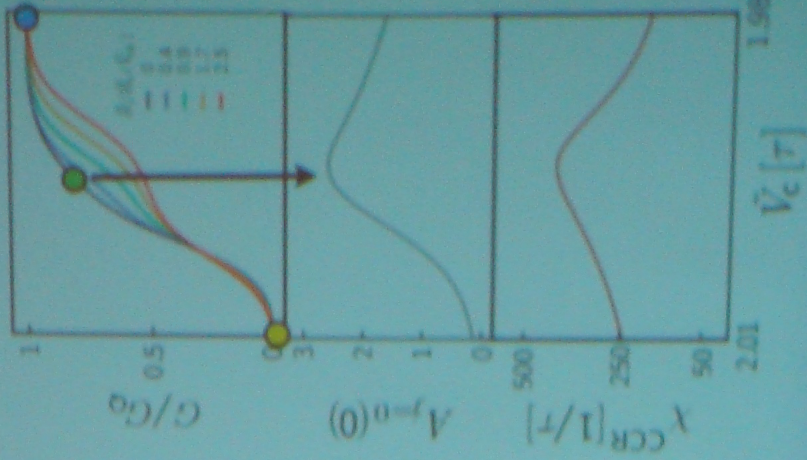
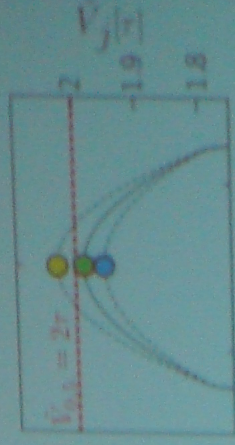
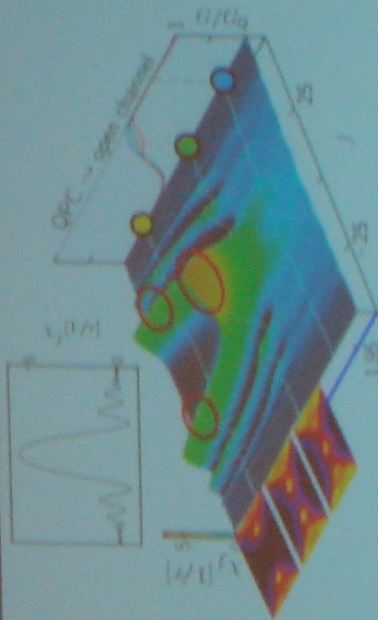
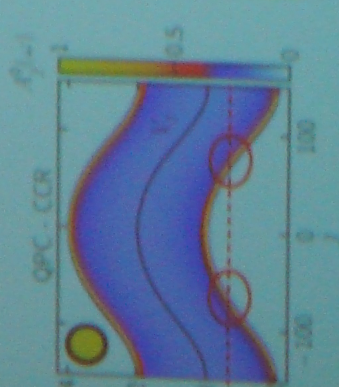
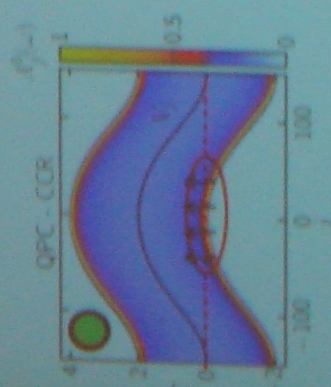
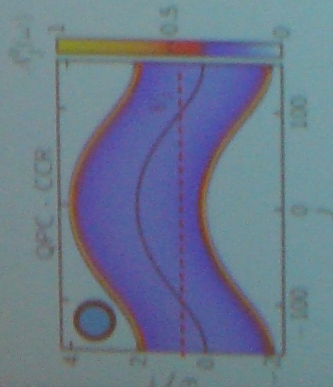


Rejec, Meir (2006)

High density of states at the fermi energy leads to

- high spin-susceptibility
- high magnetization at finite B
- increase in the effective barrier height for ↓
- decrease in conductance

DOS and spin-susceptibility: QPC



Rejec, Meir (2006)

High density of states at the fermi energy leads to

- high spin-susceptibility
- high magnetization at finite B
- increase in the effective barrier height for \downarrow
- decrease in conductance

Evolution of 0.7 anomaly at finite B can be explained by interplay of high density of states and interactions