



Sonderforschungsbereich 631
Festkörperbasierte Quanteninformationsverarbeitung



im April 2005

SEMINARANKÜNDIGUNG

Dienstag, 12. April 2005

17.15 Uhr

WSI, Seminarraum S 101

„ Hanbury Brown & Twiss correlations on GHz photons emitted by conductors A new way for quantum optics? “

Transport in quantum conductors has been investigated for about twenty years now. Conductance and noise measurements in the zero frequency limit have led to a detailed understanding of the low frequency transport. By contrast, the ac or dynamical regime has been less investigated yet, at least experimentally. Indeed the typical energy scale relevant for mesoscopic physics requires challenging GHz techniques. By using current cryogenic electronic devices, we have developed an extremely sensitive GHz set-up working down to milliKelvin temperatures. It allows us to experimentally reach the problem of electron full counting statistics in noise experiments. If one follows Nyquist, the power density of the current noise in a conductor is directly related to the d.c. power of the TEM waves the conductor emits in the external circuit. Accordingly, the low frequency fluctuations in the TEM are related to the fluctuations in the current noise power. This means that one can investigate the second and fourth moments of the electron statistics by simply measuring the first and second moments of the statistics of the emitted photons. To this end we have constructed a GHz variant of the Hanbury Brown and Twiss intensity correlation experiment. We have demonstrated its sensitivity by measuring statistics of photons emitted by various sources down to the quantum regime. Our preliminary results motivate the search for subpoissonian photons statistics which have been recently predicted in the emission of photons by quantum conductors at high frequency.

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