Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Nonlinear modification of tunneling and conductivity in two-dimensional electron gas–impurity system in strong high-frequency electric fields DMITRY SOLENOV, VLADIMIR PRIVMAN, Department of Physics, Clarkson University, Potsdam, New York 13699-5820 — We investigate two-dimensional electron gas system coupled to adjacent impurity sites. When a high-frequency uniform electric field is applied perpendicular to the electron gas layer it significantly modifies electron correlations in the impurity-gas system. At strong magnitudes of external field the system enters nonlinear dynamical control regime, similar to double quantum dot structures. In contrast to the latter, coulomb activation of the impurity sites introduces strong scattering for conduction electrons that leads to nontrivial renormalization of the tunneling. Modification of tunneling rates as a function of the field amplitude is calculated. We show that for low enough temperatures this effect is manifested in nonlinear dependence of the conductivity of two-dimensional electron gas as a function of the ac field strength. It develops a periodic peak structure.

Dmitry Solenov
Department of Physics, Clarkson University, Potsdam, New York 13699-5820

Date submitted: 22 Nov 2007 Electronic form version 1.4