Joint CQSE and CASTS Seminar

Weekly Seminar
May 12, 2017 (Friday)

TIME May 12, 2017, 14:30 ~ 15:30
TITLE Quasi-low-dimensional electron gas with one populated band
as a testing ground for time-dependent density-functional
theory of mesoscopic systems
SPEAKER Prof. Vladimir Nazarov
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Abstract
We find an exact analytical solution to the exchange-only time-dependent
density-functional theory (TDDFT) problem for a significant class of
quasi-low-dimensional (QLD) materials: QLD electron gas with only one band filled in
the direction perpendicular to the layer or wire. The theory yields the TD exchange
potential as an explicit nonlocal operator of the TD spin-density. The dressed interband
(image states) excitation spectra of Q2DEG are obtained, while the comparison with the
Kohn-Sham (KS) transitions provides insights into the qualitative and quantitative role
of the many-body interactions. Important cancellations between the Hartree $f_{H}$ and
the exchange $f_{x}$ kernels of TDDFT are found in the low-density regime, elucidating
the interrelations between the KS and the many-body dynamics in mesoscopic systems.