ANOMALOUS NON-EQUILIBRIUM ELECTRON TRANSPORT IN ONE-DIMENSIONAL QUANTUM NANO WIRE AT HALF-FILLING: TIME DEPENDENT DENSITY MATRIX RENORMALIZATION GROUP STUDY

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Recently, photo-induced insulator-metal transition has attracted great attention because of the experimental observation of the surprising ultrafast non-equilibrium phase transition [1-3]. Many theoretical investigations has been continued to understand the mechanism of the ultrafast dynamics during the phase transition [4]. However, all properties of the phase transition have been not fully understood.

In this paper, we study strongly correlated behaviors of electrons at half-filling in a short one-dimensional quantum nano-wire during the photo-pumping via an external electric field by using time-dependent density-matrix renormalization group method. As a result, we observe a very rapid growth of the s-wave superconducting correlation. The superfluid carrier is doublon which is dynamically created by the electric field. We discuss a possibility to observe our results in ultracold atom experiments in near future.

References

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[4] See for recent developments in theoretical study, e.g., N. Tsuji, T. Oka, and H. Aoki, *Nonequilibrium Steady State of Photoexcited Correlated Electrons in the Presence of Dissipation*, Physical Review Letters, **103**, 047403 (2009).