

1106-81-2230

Chandrashekar Channipura Madaiah* (c.madaiah@oist.jp), Quantum systems Unit,
Okinawa Institute of Science and Technology, 1919-1 Tancha, Onna-son, Okinawa 9040495, Japan.

Disorder and noise as passage for interplay between localization and diffusion of quantum walk.

It has been shown by many earlier works that the disorder induces a dramatic change in the interference pattern leading to localization of the quantum walks in one- and two-dimensions. In this talk we will present the time evolution of one- and two-dimensional discrete-time quantum walk with different degree of disorder and study its effect on the quantum correlation (negativity). We use spatial, temporal and spatio-temporal broken periodicity of the unitary evolution as disorder and analytically show the dynamics leading to localization. We focus on the transition point in the degree of disorder leading to the localization of the walk which normally spreads linearly with steps. We also show the decrease in the particle and position quantum correlation with spatial disorder and counter intuitively, an enhancement in correlations with temporal and spatio-temporal disorder will also be presented.

By introducing a small amount of noise into the disordered dynamics we show the passage from the localized to the diffusive dynamics. This brings up a variety of intriguing questions relating to the role of disorder and noise in the interplay between localization (Anderson Localization) and diffusion of quantum dynamics. (Received September 16, 2014)