



The Abdus Salam
International Centre for Theoretical Physics



**Advanced Workshop on
"Anderson Localization, Nonlinearity and
Turbulence: A Cross-Fertilization"**

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TITLE:

"The crossover from strong to weak chaos for nonlinear waves in disordered systems"

ABSTRACT:

We observe a crossover from strong to weak chaos in the spatiotemporal evolution of multiple site excitations within disordered chains with cubic nonlinearity. Recent studies have shown that Anderson localization is destroyed, and the wave packet spreading is characterized by an asymptotic divergence of the second moment m_2 in time (as $t^{1/3}$), due to weak chaos. In the present paper, we observe the existence of a qualitatively new dynamical regime of strong chaos, in which the second moment spreads even faster (as $t^{1/2}$), with a crossover to the asymptotic law of weak chaos at larger times. We analyze the peculiarities of these spreading regimes and perform extensive numerical simulations over large times with ensemble averaging. A technique of local derivatives on logarithmic scales is developed in order to quantitatively visualize the slow crossover processes."