

ICTS Statistical Physics Journal Club Seminar

Title : Dynamics of a particle moving in a two-dimensional Lorentz Lattice gas

Speaker : Shradha Mishra (Indian Institute of Technology (BHU) Varanasi)

Date : Thursday, 5th November 2020

Time : 03:00 pm (IST)

Abstract : We study the dynamics of a particle moving in a two-dimensional Lorentz lattice-gas. The underlying lattice-gas is occupied by two kinds of rotators, "right-rotator (R)" and "left-rotator (L)" and some of the sites are empty {\it viz.} vacancy "V". The density of R and L are the same and density of V is one of the key parameters of our model. The rotators deterministically rotate the direction of a particle's velocity to the right or left and vacancies leave it unchanged. We characterise the dynamics of particle motion for different densities of vacancies. The probability of the particle being in a closed or open orbit is a function of the density of vacancies and time. As the density of vacancies increases in the system, the tendency to form a closed orbit reduces. Since the system is deterministic, the particle forms a closed orbit asymptotically. We calculate the probability of the particle to get trapped in a closed orbit and extract the Fisher's exponent in the diffusive regime. We also calculate the fractal dimension and observe a consistent change in the values as we increase the number of vacancies in the system. The system follows the hyper-scaling relation between the Fisher's exponent and fractal dimension for a finite vacancy density.

Online : Please click on the below link to join the seminar

Seminar <https://zoom.us/j/96822494512?pwd=WXluYXJYaEJtd2JYN2lTa0R4TnlsZz09>
Meeting ID: 968 2249 4512
Passcode: 468501