

Inapplicability of Avila's theory in the diamond chain with quasiperiodic disorder

Auditya Sharma¹, Manish Kumar¹, Ivan Khaymovich²

¹Indian Institute Of Science Education And Research Bhopal, Bhopal, India, ²Nordita, Stockholm University and KTH Royal Institute of Technology, Stockholm, Sweden

The mobility edges (MEs) that separate localized, multifractal and ergodic states in energy are a central concept in understanding Anderson localization. In this work we study the effect of several mutually commensurate quasiperiodic frequencies on the mobility edge formation. We focus on the example of the addition of a constant offset to the quasiperiodic potential of the one-dimensional all-bands-flat diamond chain. We show that this additional offset can transform the anomalous mobility edges (AMEs), i.e. the energies, separating localized and multifractal states, into conventional mobility edges, separating localized from delocalized states. Also this appears to be the first example which shows the inability of Avila's global theory to analytically predict the ME location. We observe this both quantitatively, through the ME location mismatch, and qualitatively, via the formation of multiple MEs, not predicted by the theory.