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## **Many-body Physics with Quantum Gases in Disorder**

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### Abstract:

I will first give a brief overview of the studies of ultracold quantum gases in disorder and then turn to one-dimensional interacting disordered bosons at finite temperatures. It will be shown that they may undergo an interaction-induced non-conventional insulator-fluid transition, and I will present the phase diagram. The next issue will be interacting bosons in the quasiperiodic potential (superposition of two incommensurate one-dimensional lattices). I will demonstrate the presence of finite temperature many-body localization-delocalization transition induced by the interaction between the bosons. It will be shown that in a wide range of parameters an increase in temperature favors the insulator state, so that in this sense one has an anomalous “freezing with heating” phenomenon. The origin of this phenomenon lies in a peculiar behavior of single-particle states.