ABSTRACT:
A large class of one-dimensional particle systems are predicted to share the same universal long-time/large-scale behaviors. By studying certain integrable models within this (Kardar-Parisi-Zhang) universality class we access what should be universal statistics and phenomena. The purpose of this talk is to study two different integrable exclusion processes: q-TASEP and ASEP. We develop the theory of Macdonald processes (generalizing Okounkov and Reshetikhin’s Schur processes) which unites integrability in various areas of probability including directed polymers, particle systems, growth processes and random matrix theory. The solvability of q-TASEP fit into this theory. ASEP does not, but shares many parallel formulas to q-TASEP as well as an analogous relationship to generalizations of the delta Bose gas. This suggests the search for a structure sitting above Macdonald processes which explains these parallels and includes ASEP.