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*Processes with zero-range interaction and integrability*

Zero-range processes are interacting particle systems where particles hop between the lattice sites with rates that depend solely on the number of particles of the departure site. The behaviour on the long wavelength and time-scale of zero-range processes have been extensively studied, and asymptotic results such as hydrodynamic scaling limit, central limit theorem, or large deviations of the empirical distribution of particles have been established. A specific zero-range process on the 1-dimensional infinite lattice, the $q$-Boson system, was introduced by Sasamoto and Wadati. The q-Boson specifies that a single particle leaves a site at a rate equal to $[n]$, the $q$-integer of the site occupancy $n$. Notably, the $q$-Boson was shown to be integrable in the sense that a class of eigenfunctions can be constructed for the Hamiltonian of the process. Later the $q$-Boson system was generalized by Takeyama using the algebra structure generated by the multiplication and divided-difference operators of Lascoux and Schützenberger. The system built by Takeyama is totally asymmetric, exhibits zero-range interaction, and has the novel feature that any number of available particles can leave the site. We show that the system of Takeyama can be enhanced to allow the movement of particles to both left and right and remain integrable. Also, we discuss the attractiveness and propose that the hydrodynamic scaling limit of the system is a first-order quasilinear partial differential equation.