Nonlinear Sciences > Exactly Solvable and Integrable Systems

A class of integrable Hamiltonian systems including scattering of particles on the line with repulsive interactions

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The main purpose of this paper is to introduce a new class of Hamiltonian scattering systems of the cone potential type that can be integrated via the asymptotic velocity. For a large subclass, the asymptotic data of the trajectories define a global canonical diffeomorphism A that brings the system into the normal form $\dot P=0$, $\dot Q=P$.
The integrability theory applies for example to a system of n particles on the line interacting pairwise through rather general repulsive potentials. The inverse r-power potential for arbitrary $r>0$ is included, the reduction to normal form being carried out for the exponents $r>1$. In particular, the Calogero system is obtained for $r=2$. The treatment covers also the nonperiodic Toda lattice.
The cone potentials that we allow can undergo small perturbations in any arbitrary compact set without losing the integrability and the reduction to normal form.

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