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Global Existence and Singularity of the N-body Problem.

Unstable dispersive Hamiltonian evolution equations, such as semi-linear Klein-Gordon and Schrodinger equations, exhibit "soliton"-like solutions. Amongst those one singles out the ground state, which has the lowest energy of all solitons. When the solutions are restricted to have energies at most slightly above that of the ground state, one obtains a trichotomy in forward time for this regime of energies. Recently, we found that this idea could be used to characterize solutions in the N-body problem. The N-body problem is an initial-value problem for ordinary differential equations. The appropriate candidates of the ground states in the N-body problem are the relative equilibria, which are solutions whose configuration remains an isometry of the initial configuration. The characterization of solutions for the two-body problem in this new perspective is completely solved, and it resembles the results in PDE nicely. For $N > 2$, the question becomes quite complicated, and I will give some partial results.