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Two- and three-particle scattering in the (1+1)-dimensional $O(3)$ non-linear sigma model

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In this talk, I will present our recent results on two- and three-particle scattering in the $O(3)$ non-linear sigma model in 1+1 dimensions. We focus on the isospin-1 and 2 channels for the two-particle case, and the isospin-2 and 3 channels for three particles. We perform numerical simulations at four values of the physical volume and three lattice spacings, using a three-cluster generalization of the cluster update algorithm. The lattice results for two particles are then compared against exact analytic predictions of the finite-volume energy levels obtained combining analytic results for the phase shifts and the (1+1)-dimensional two-particle scattering formalism. For the three-particle results, we use the relativistic field theory (RFT) approach to constrain the scheme-dependent three-body interaction.

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