

SCET Workshop 2022



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Simulating collider physics on quantum computers using SCET

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Quantum simulations of the full dynamics of a quantum field theory over a wide range of energies requires exceptionally large resources. Yet for many observables in particle physics, perturbative techniques are sufficient to accurately model all but a constrained range of energies within the validity of the theory. SCET naturally provides an efficient separation of dynamics well-described by perturbation theory from those requiring additional treatment, and we present a formalism to embed the results of quantum calculations into SCET-like theories. As an explicit example we calculate the zero- and one-particle emission contributions to the soft function of an SCET-like treatment of massless scalars and compare to simulations on an IBMQ quantum processor. We also report on preliminary work extending these results to abelian gauge theories.

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