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Using transformers to calculate scattering amplitudes

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We pursue the use of Transformers to compute scattering amplitudes in planar $N = 4$ super-Yang-Mills theory, a quantum field theory closely related to Quantum Chromodynamics (QCD). By expanding multiple polylogarithm functions in the Feynman integrals using the symbol map, we formulate scattering amplitudes in a language-based representation that is amenable to Transformer architectures and standard training objectives. We then show that an encoder-decoder Transformer can achieve high accuracy ($> 98\%$) on two tasks in this representation- prediction of the integer coefficients of individual terms at a given loop order from the terms themselves, and prediction of coefficients at one loop order from a related subset of coefficients at a lower loop order. Finally, we explore interesting properties of the learning dynamics and representations learned by our model.

Brainstorming idea [title]

Brainstorming idea [abstract]

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