

The Pole-Factorization Theorem in S-Matrix Theory[★]

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Abstract. Previous derivations of physical-region discontinuity formulas in S-matrix theory make use of an ad hoc assumption according to which certain sets of singularities associated with mixed- α Landau diagrams cancel among themselves. The aim of the present work is to prove the simplest of these discontinuity formulas, namely, the pole-factorization theorem for a $3 \rightarrow 3$ equal-mass process below the 4-particle threshold, without using this mixed- α cancellation assumption. The result is derived from macro-causality, unitarity and two weak regularity assumptions on scattering functions and bubble diagram functions.

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1. Introduction

The basic quantities of interest in the study of systems of massive particles with short-range interactions are the scattering functionals S_{IJ} between sets I and J of

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