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1 Introduction

This is a final report on DOE grant DE-FG02-90ER-40577 for its entire period from June 1, 1990 to April 30, 2012. The PIs on this grant were as follows: John Collins for the whole period of the grant, and Radu Roiban from January 1, 2009 onwards.

2 Results

Many results important results in perturbative QCD and string theory. In QCD highlights include

- The discovery of a number of situations where transverse single-spin asymmetries occur at leading power in a hard scattering. These results have played a big role in provoking successful experimental searches for these effects.
- A proof of factorization for diffractive hard reactions in DIS was found, with a disproof of the corresponding results in hadron-hadron scattering.
- A textbook giving a systematic treatment of perturbative QCD was written by Collins and published in 2011. This book included a number of new results. This included missing proofs of (effectively conjectured) important results.
- New and greatly improved formulations of factorization using transverse-momentum-dependent parton densities.

In string theory and related areas, highlights include

- Implications of integrability in string theory.
- The construction and use of new methods inspired by string theory to high-order calculations in gauge theories.

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