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Faculty

IAIN STEWART

Professor of Physics



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Related Links:

[Personal web page](#)

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Area of Physics:

[Theoretical Nuclear and Particle Physics](#)

Research Interests

Professor Stewart's research interests involve theoretical nuclear and particle physics. In particular, he focuses upon the development and application of effective field theories to answer fundamental questions about interactions between elementary particles, including weak and electromagnetic interactions, and in particular strong interactions described by Quantum Chromodynamics (QCD). The idea of an effective field theory is to determine the relevant degrees of freedom and symmetries of a system and combine this with a power counting expansion to derive an efficient and precise field theory framework for calculations.

Professor Stewart is a co-inventor of the Soft-Collinear Effective Theory (SCET), a field theory that separates short and long distance physics in processes involving energetic collisions of quarks, gluons, and other particles. This formalism makes it possible for a universal set of tools to handle a wide range of physics probed at proton and electron colliders, including jet physics, B meson physics, quarkonia production, and nuclear physics. Applications to B mesons include the study of QCD dynamics, the search for new physics in rare decays, and the measurement of parameters and testing of symmetries of the standard model. Professor Stewart has also contributed in the areas of Heavy Quark Effective Theory (for b quark decays), Non-Relativistic QCD and QED (for heavy quark-antiquark systems and atomic systems like Hydrogen and positronium), and Nucleon Effective Theory (for two nucleon or deuteron systems interacting with low energy pions).

A major focus of Stewart's current work is on theoretical ingredients needed to describe proton collisions at the Large Hadron Collider (LHC). Examples include his work on Higgs production

and the use of specialized event shape variables to describe jet production.

Biographical Sketch

Professor Stewart joined the Physics faculty at MIT in January of 2003, and was promoted to Associate Professor with tenure in 2009. Before that he was a Research Assistant Professor with the Institute for Nuclear Theory at the University of Washington in 2002, and a postdoctoral research associate at the University of California, San Diego from 1999– 2001. Dr.

Stewart received his Ph.D. from the California Institute of Technology in 1999. He earned a Masters degree in Physics from the University of Manitoba, Canada in 1995, as well as an Honors B.Sc. degree there in Physics and Mathematics in 1994.

Selected Publications

- Top cited publications: [50+](#) [100+](#)
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