

Final Report for award DE-SC0013982

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Sponsoring Office: Department of Energy, Division of High Energy Physics

Name of recipient: University of Colorado

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Abstract

The Theoretical Advanced Study Institute was held at the University of Colorado, Boulder, during June 1-26, 2015. The topic was "New Frontiers in Fields and Strings." The organizers were Professors Joseph Polchinski (KITP Santa Barbara) and Pedro Vieira (Perimeter Institute). Sixty one students heard sixty two lectures by sixteen lecturers. A Proceedings is in press.

Summary

The Theoretical Advanced Study Institute (TASI) is a summer intensive program supported by the Department of Energy and the National Science Foundation. It has been in existence since 1984 and has been held in Boulder CO since 1989. The primary purpose of TASI is to provide a series of lectures and seminars aimed at advanced graduate students on topics of current research in theoretical elementary particle physics and on related experimental subjects. This is done to broaden their horizons beyond the thesis topics they pursue at their home institutions.

TASI is overseen by a Scientific Advisory Board, who chooses the general theme of each institute and recruits scientific directors to make up the program. The present chair of the Board is S. Dawson (Brookhaven National Laboratory). Other members of the Board during TASI-2014 were C. Johnson (USC), T. Han (Pittsburg), T. LeCompte (Fermilab), J. Maldacena (Princeton, IAS), and T. DeGrand (Colorado).

The University of Colorado is responsible for its local infrastructure. TASI 2015 was held at the University of Colorado, Boulder, during June 1 - 26, 2015. The topic was "New Frontiers in Fields and Strings." The organizers were Professors Joseph Polchinski (KITP Santa Barbara) and Pedro Vieira (Perimeter Institute).

There were sixty one students. Sixteen lecturers gave sixty two seventy five minute lectures. Each speaker gave several lectures in his/her chosen field. We had a number of question and answer sessions, many of which turned into impromptu lectures. The students organized their own series of brief talks. The atmosphere at TASI is designed to engender an intense interaction among students and lecturers, and once again it was successful in doing this. This TASI was the first one to cover formal topics since 2010. Topics included many discussions of entanglement entropy, the conformal bootstrap, AdS/CFT techniques and applications, cosmology, and the black hole information problem.

A Proceedings is in press. The publisher will be World Scientific, Singapore, and the editor will be Oliver DeWolfe.

TASI 2015 also had a well-attended public lecture by Joe Polchinski, "Spacetime versus the quantum."

Lecturers and topics:

Joao Penedones (Porto U.) -- Introduction to AdS/CFT
Raphael Flauger (Princeton IAS) -- Effective Field Theory
Nati Seiberg (Princeton IAS) -- Supersymmetric Gauge Theories
David Simmons-Duffin (Princeton IAS) -- Conformal Bootstrap
Mark van Raamsdonk (British Columbia) -- Entanglement Entropy I
Juan Maldacena (Princeton IAS) -- Entanglement Entropy II
Eva Silverstein (Stanford) -- String Cosmology
Leonardo Senatore (Stanford) -- Primordial Cosmology
Freddy Cachazo (Perimeter) -- Scattering Amplitudes
Pedro Vieira (Perimeter) -- Scattering and Integrability
Mariangela Lisanti (Princeton) -- Particle Phenomenology for String Theorists I
Riccardo Rattazzi (Lausanne) -- Particle Phenomenology for String Theorists II
John McGreevy (UCSD) -- Condensed matter and AdS/CM duality
Joe Polchinski (KITP) -- The Black Hole Information Problem
Simone Giombi (Princeton) -- Higher Spin - CFT Duality
Carlos Mafra (Cambridge) -- Superstring Perturbation Theory