Symmetry and Topology in Particle Physics

Rapport sur les contributions

https://indico.math.cnrs.fr/e/16013

ID de Contribution: **1** Type: **Non spécifié**

Electron-Monopole Scattering from Conformal Field Theory

lundi 9 mars 2026 09:30 (1 heure)

S-wave scattering of electrons off of heavy magnetic monopoles is an important problem both in formal theory and in particle phenomenology. It has long been understood that this scattering can be effectively studied in two-dimensional conformal field theory with a recently appreciated crucial role played by topological line defects and generalized global symmetry. We use the formalism of boundary CFT to compute the S-matrix to leading order in electromagnetic coupling and find agreement with expectations from unitarity.

Orateur: CÓRDOVA, Clay (University of Chicago)

ID de Contribution: **2** Type: **Non spécifié**

Discussion: ”Monopoles, Strings, etc.”

lundi 9 mars 2026 11:00 (1h 30m)

Orateurs: BRENNAN, Daniel (University of Birmingham); HONG, Sungwoo (KAIST)

ID de Contribution: **3** Type: **Non spécifié**

Free discussion

lundi 9 mars 2026 14:00 (1 heure)

ID de Contribution: **4** Type: **Non spécifié**

Abelian Instantons in Quantum Field Theory and Gravity

lundi 9 mars 2026 15:30 (1 heure)

Orateur: GARCÍA GARCÍA, Isabel (University of Washington)

ID de Contribution: **5** Type: **Non spécifié**

2d Dualities and Mass Hierarchies

mardi 10 mars 2026 14:00 (1 heure)

I will explore the Kramers-Wannier duality in the continuum and comment on its implications for the electroweak hierarchy problem.

Orateur: TITO D'AGNOLO, Raffaele (IPhT, CEA Saclay/ENS)

ID de Contribution: **6** Type: **Non spécifié**

Discussion ”Generalized Symmetries: Useful for Model Building?”

mardi 10 mars 2026 11:00 (1h 30m)

Orateurs: CRAIG, Nathaniel (UC Santa Barbara); GRIPAIOS, Ben (Cambridge University)

ID de Contribution: **7** Type: **Non spécifié**

Dynamics of the Fermion-Rotor System

mardi 10 mars 2026 09:30 (1 heure)

In this talk, I will examine the dynamics of the fermion–rotor system, originally introduced by Polchinski as a toy model for monopole–fermion scattering. Despite its simplicity, the system is surprisingly subtle, with ingoing and outgoing fermion fields carrying different quantum numbers. I will show that the rotor acts as a twist operator in the low-energy theory, changing the quantum numbers of excitations that have previously passed through the origin to ensure scattering consistent with all symmetries, thereby resolving the long-standing Unitarity puzzle. I will then discuss generalizations of this setup with multiple rotors and unequal charges, and demonstrate how the system can be viewed as a UV-completion of boundary states for chiral theories, establishing a connection to the boundary conformal field theory based proposal for resolving the puzzle.

Orateur: LOLADZE, Vazha (University of Oxford)

ID de Contribution: **8** Type: **Non spécifié**

Free discussion

mardi 10 mars 2026 15:30 (1 heure)

ID de Contribution: **9** Type: **Non spécifié**

QCD Wilson Lines in IR Chiral Lagrangian (Remote)

mardi 10 mars 2026 16:30 (1 heure)

In this talk, we will answer the question: What does a QCD Wilson line flow to in the IR chiral Lagrangian? We will first present a symmetry-based argument showing that the Wilson line is not completely screened in the IR. We then propose a disorder operator realization of the Wilson line in the chiral Lagrangian. This allows us to model heavy-light mesons and baryons and describe the dissolution of confining strings into pions within the chiral Lagrangian.

Orateur: LAM, Ho Tat (Stanford University)

ID de Contribution: **10** Type: **Non spécifié**

Spurion Analysis for a Class of Selection Rules Without Group Actions

mercredi 11 mars 2026 09:30 (1 heure)

Recent advances have uncovered a new class of selection rules in particle physics models arising from non-invertible fusion algebras. We refer to these as non-invertible selection rules (NISRs), distinguishing them from conventional selection rules derived from ordinary group laws. In this talk, we illustrate their implications in perturbation theory using spurion analysis, and connect to aspects of "loop-induced groupification" and particle decoupling in effective field theories. The discussion is based on arXiv 2510.18972, 2508.14970, 2503.19964.

Orateur: XU, Ling-Xiao (ICTP)

ID de Contribution: **11** Type: **Non spécifié**

Discussion: ”The Global SM & Beyond”

jeudi 12 mars 2026 11:00 (1h 30m)

Orateurs: HSIN, Po-Shen (King’s College London); KOREN, Seth (University of Notre Dame)

ID de Contribution: **12** Type: **Non spécifié**

Free discussion

mercredi 11 mars 2026 14:00 (1 heure)

ID de Contribution: **13** Type: **Non spécifié**

Student talks

mercredi 11 mars 2026 15:30 (1 heure)

Orateurs: GAGLIANO, Finn (Durham University); BEREAN-DUTCHER, Jonah (UBC & IHES); KONG-SORE, Marius (NYU)

ID de Contribution: **14** Type: **Non spécifié**

Berry Phase on Boundary Conformal Manifolds

jeudi 12 mars 2026 09:30 (1 heure)

Conformal boundary conditions appear in various different contexts, in the study of impurities, scattering of massless particles off a heavy monopole, D-branes, and so on. I will discuss a new "higher"geometric structure the space of conformal boundary conditions possesses in 1+1d conformal field theories.

Orateur: CHOI, Yichul (Institute for Advanced Study)

ID de Contribution: **15** Type: **Non spécifié**

Discussion: ”The S-Matrix, Generalized”

mercredi 11 mars 2026 11:00 (1h 30m)

Orateurs: CÓRDOVA, Lucia (University of Amsterdam); GARCÍA-SEPÚLVEDA, Diego (Harvard University)

ID de Contribution: **16** Type: **Non spécifié**

Testing Stringy and Field Theory GUTs With Axions

jeudi 12 mars 2026 14:00 (1 heure)

The topological nature of axion couplings to gauge bosons offers unique opportunities to obtain information about the UV limit of the SM. The coupling to photons is particularly important experimentally. I will discuss why the discovery of an axion-like particle above the QCD line would rule out grand unified theories, the perturbative heterotic string, and F-theory GUTs. Based on 2206.07053, 2410.03820 and 2509.08042.

Orateur: REIG, Mario (CERN)

ID de Contribution: **17** Type: **Non spécifié**

Free discussion

jeudi 12 mars 2026 15:30 (1 heure)