

2022 Winter School in Mathematical Physics



Report of Contributions

Contribution ID: 1

Type: **not specified**

Vito Pellizani (UNIBE) - Conformal algebra automorphism: from theory to experiment

Wednesday 12 January 2022 09:00 (25 minutes)

Conformal field theories (CFTs) are usually strongly coupled, which means that standard quantum field theory techniques fail. At the same time, conformal symmetry is such a strong constraint that any observable can be derived from a set of simple building blocks, the so-called CFT data. On top of that, the conformal algebra has an automorphism which identifies the Hamiltonian on $\mathbb{R} \times S^{\hat{d}-1}$ with the dilatation operator on $\mathbb{R}^{\hat{d}}$, whose eigenvalues are part of the CFT data of the theory. The task of collecting these eigenvalues thus reduces to the computation of energy levels on the cylinder. In this talk, I will carefully review this correspondence and its nonrelativistic avatar which, totally unexpectedly, provides an exact connection with ultracold atom experiments! In order to illustrate the power of this technique, I will discuss the case of conformal theories with global symmetries.

Session Classification: Short talks

Contribution ID: 2

Type: **not specified**

Sid Maibach (Bonn) - Real Valued 1D Genus 0 Modular Functors for the Weyl anomaly

Wednesday 12 January 2022 09:25 (25 minutes)

I will introduce the real determinant line bundle which characterizes the Weyl anomaly as a real-valued one-dimensional modular functor over the genus 0 moduli space of Riemann surfaces with analytically parametrized boundaries.

A universal property of such modular functors is obtained by studying the corresponding central extensions of the group of analytical circle diffeomorphisms. In particular, a cocycle using rotation numbers does not appear and hence the central extension is the Virasoro-Bott group or trivial.

Session Classification: Short talks

Contribution ID: 3

Type: **not specified**

Baptiste Cerclé (Paris-Saclay)- Towards integrability of Toda conformal field theories.

Wednesday 12 January 2022 09:50 (25 minutes)

Toda conformal field theories are a family of two-dimensional conformal field theories indexed by semi-simple and complex Lie algebras. One of their features is that, in addition to conformal symmetry, they enjoy an extended level of symmetry encoded by W -algebras. Besides, they can be defined via a path integral similar to the one of Liouville theory for which they provide a natural generalization. In this talk we will review recent progress made towards integrability of such theories, relying on a probabilistic formulation of the models and additional materials specific to Toda theories.

Session Classification: Short talks

Contribution ID: 4

Type: **not specified**

Weronika Czerniawska (UNIGE) - Selective Integration on Adelic Spaces and the Riemann-Roch theorem

Wednesday 12 January 2022 10:15 (25 minutes)

One cannot directly integrate over 2-dimensional geometric adeles associated to arithmetic and geometric surfaces, since they are not locally compact spaces. Nevertheless it is still possible to conduct selective integration by choosing locally compact subquotient spaces. This leads to new integral representations of various geometric and arithmetic invariants and to new proofs of the arithmetic Riemann-Roch theorem in dimension two.

Session Classification: Short talks

Contribution ID: 5

Type: **not specified**

Hadi Nahari (Lyon) - Morita equivalence of singular Riemannian foliations and I-Poisson geometry

Wednesday 12 January 2022 10:40 (25 minutes)

We define the notion of Morita equivalence for singular Riemannian foliations (SRFs) such that the underlying singular foliations are Hausdorff-Morita equivalent as recently introduced by Gardenia and Zambon. Then we introduce the category of I-Poisson manifolds where its objects are just Poisson manifolds together with appropriate ideals of smooth functions, but its morphisms are an important relaxation of Poisson maps. We show that every singular foliation gives rise to an I-Poisson manifold and SRFs can be translated into this setting. This perspective permits us to construct an algebraic invariant of Hausdorff Morita equivalence for singular foliations. This is a joint work in progress with T. Strobl.

Session Classification: Short talks