Program and Abstracts of the
Weihnachtsworkshop 2020
on Geometry and Number Theory
14th of December 2020

14:00 - 14:45   Corinna Ulcigrai (Zürich)
Enumerating pseudo-Anosov maps via diagonal changes

15:00 - 15:45   Jan Kohlmüller (Karlsruhe)
Examples of families of infinite translation surfaces

16:00 - 16:45   Noé Bárcenas Torres (Saarbrücken/Morelia)
A probabilistic approach to rigidity of actions of the mapping class group

17:00 - 17:45   Dimitri Zvonkine (Paris)
Quantum Hall effect, symmetric power of a curve, and the universal Jacobian

17:45 - 18:15   Social Closure

Abstracts

Noé Bárcenas Torres:

A probabilistic approach to rigidity of actions of the mapping class group

Using methods from stochastic topology, in particular the multiparametric model for random simplicial complexes by Costa and Farber, I will present a result which can be considered as probabilistic evidence for Ivanovs' rigidity metaconjecture of actions of big mapping class groups.

Jan Kohlmüller:

Examples of families of infinite translation surfaces

In his work from 2004 Reza Chamanara established a family of translation surfaces X_α for $\alpha \in (0,1)$, the so-called Chamanara surfaces. In this talk we will generalize this construction and have a look at some families consisting of these generalized surfaces. We will ask the question if there is some form of natural homeomorphism from these families to a suitable vector space. To answer this we will take a look at the immersive topology on the moduli space of all (finite and infinite) translation surfaces as constructed by Patrick Hooper. At last we will see some explicit families and homeomorphisms.

Corinna Ulcigrai:

Enumerating pseudo-Anosov maps via diagonal changes

We will describe a geometric algorithm that generalizes the classical continued fraction algorithm to translation surfaces. The elementary moves of the algorithm consist of 'diagonal changes' on triangulations of the surface: in the hyperelliptic case, we combine moves to preserve certain quadrangulations of the given surface. In contrast with other well studied algorithms (such as Rauzy-Veech induction), diagonal changes produce all saddle connections which are best approximations in a geometric sense. We show how to use diagonal changes in hyperelliptic components to enumerate (i.e.computationally produce a list of) all pseudo-Anosov mapping classes. This is based on joint works with Vincent Delecroix.

Dimitri Zvonkine:

Quantum Hall effect, symmetric power of a curve, and the universal Jacobian

A quantum state of a charged particle on a compact surface C is described by a section of a certain line bundle L over C. Ground states (that is, states with smallest energy) are holomorphic sections. States with N particles are symmetric sections of a line bundle over C^N. The dimension of the space of sections is one of the main features of the system. As the surface C or of the line bundle L change, spaces of sections $H^0(C, L)$ form vector bundles whose Chern classes are physically measurable quantities. Thus physical questions on electrically charged particles on a surface lead to questions in intersection theory, some of which we solve using the Grothendieck-Riemann-Roch formula. Work in progress with Semyon Klevtsov.