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Research interests:

- Moduli spaces of flat surfaces and k-differentials (geometry, topology, volumes...).
- Teichmüller theory, representations of mapping class groups.
- Billiards, Teichmüller dynamics in moduli spaces.

Latest results

Theorem (N.)

Every stratum of k-differentials carries a **canonical** *volume form. The volume of the set of surfaces with area $\leqslant 1$ in every stratum is finite.*

Remarks:

- In the case $k \in \{1, 2\}$, this result is due to Masur and Veech.
- Another proof of finiteness by B. Dozier (using the compactification of strata of k-differentials by multi-scale differentials introduced by Bainbridge-Chen-Gendron-Grushevsky-Möller).

Theorem (N.)

In genus 0, there exists an explicit recursive formula to compute the volume of all strata of k-differentials such that none of the orders of zeros and poles is a multiple of k.

Corollary

A new proof of a formula computing the volumes of strata of quadratic differentials with simple poles and zeros of odd order in genus 0 *which was predicted by Kontsevich and proved by Athreya-Eskin-Zorich.*

Corollary

Fix an integer $n \geqslant 3$. *Let*

$$\mathbf{L}_n = \{\mu = (\mu_1, \dots, \mu_n) \in \mathbb{R}^n_{<1} \ : \ \mu_1 + \cdots + \mu_n = 2\}$$

Given $\mu \in \mathbf{L}_n$, $\mathcal{C}(\mu)$ *denotes the moduli space of flat metrics on the sphere having exactly n cone singularities with angles* $\theta_i = 2\pi(1 - \mu_i)$ *up to scaling. Then there is a piecewise polynomial continuous function* $\mathcal{F}_n : \mathbf{L}_n \to \mathbb{R}$ *such that*

- *each polynomial piece of* $\mathcal{F}_n$ *has rational coefficients and degree at most* $n - 3$,
- *if* $\mu_i \notin \mathbb{Z}$ *for all* $i = 1, \dots, n$, *then* $\mathcal{F}_n(\mu)$ *gives the volume of* $\mathcal{C}(\mu)$.