# Publication List

Jaejeong Lee

- *"Convex fundamental domains for properly convex real projective structures"*
  in preparation (a draft version available upon request)

  I prove that every properly convex real projective structure has a convex fundamental polyhedron. Using the hyperbolic affine sphere interpretation by Labourie and Loftin of properly convex real projective structures, I provide a new construction of a certain invariant polyhedron $\mathcal{E}$ in the affine space such that each facet of $\mathcal{E}$ gives rise to a convex fundamental polyhedron via projectivization.

  I also consider another invariant polyhedron $\mathcal{I}$ which is the convex hull of an orbit lying in the hyperbolic affine sphere. For convex real projective structures coming from symmetric spaces, I show that the tessellations obtained by projectivizing the facets of $\mathcal{E}$ and $\mathcal{I}$ are Poincaré dual to each other; this holds in particular for hyperbolic structures.

  Finally, I interpret the convex fundamental polyhedron obtained by projectivizing a facet of $\mathcal{E}$ as the Dirichlet domain with respect to a certain invariant two-variable function, which generalizes the function Selberg considered in his study of lattices in the symmetric space $\mathrm{SL}(n, \mathbb{R})/\mathrm{SO}(n, \mathbb{R})$.

- *"A convexity theorem for real projective structures"*
  submitted (available at `http://front.math.ucdavis.edu/0705.3920`)

  I prove a version of the Poincaré fundamental polyhedron theorem for convex real projective structures:

  Given a finite collection $\mathcal{P}$ of convex polytopes in $\mathbb{RP}^n$, suppose that $M$ is a real projective manifold which is obtained by gluing together the polytopes in $\mathcal{P}$ along their facets in such a way that the union of any two adjacent polytopes sharing a common facet is convex. Then, I show that the projective structure on $M$ is

  1. convex if $\mathcal{P}$ contains no triangular polytope, and
  2. properly convex if, in addition, $\mathcal{P}$ contains a polytope whose dual polytope is thick.

  Here, triangular polytopes and polytopes with thick duals are defined as analogues of triangles and polygons with at least five edges, respectively.

  This theorem is valid in all dimensions and it does not require that the gluing maps be reflections. In this sense, it generalizes the convexity result in the Tits–Vinberg fundamental domain theorem for discrete linear groups generated by reflections, which is valid in small dimensions only.