Research highlight: Affine actions with Hitchin linear part

Work of President's Assistant Professor ZHANG Tengren

Properly discontinuous actions of a surface group by affine automorphisms of d-dimensional affine space were shown to exist by Danciger-Guéritaud-Kassel [1]. In their work, Prof. Danciger and Dr. Zhang show that if the linear part of an affine surface group action is in the $\mathrm{SL}(d,\mathbb{R})$-Hitchin component, then the action fails to be properly discontinuous. The key case is when $d=2n-1$, and this linear part lies in $\mathrm{S}(n,n-1)$, i.e. the affine action is by isometries of a flat pseudo-Riemannian metric of signature $(n,n-1)$. This generalizes a previous result of Labourie [2]. They also prove a negative curvature analogue of their result: the action of a surface group on the pseudo-Riemannian hyperbolic space of signature $(n,n-1)$ by a $\mathrm{PSO}(n,n)$-Hitchin representation fails to be properly discontinuous.

References:

[1] Jeffrey Danciger, François Guéritaud, and Fanny. Kassel, **Proper affine actions for right-angled coxeter groups**, arXiv:1804.03132, 2018.

[2] François Labourie, **Fuchsian affine actions of surface groups**, J. Differential Geom. 59 (2001), no. 1, 15 – 31.

[3] Jeffrey Danciger and Tengren Zhang, **Affine actions with Hitchin linear part**, Geom. Funct. Anal. 29 (2019), 1369 – 1439.