

**Speaker:** Dalimil Mazac

**Title:** Hyperbolic manifold spectral bounds from linear programming

**Abstract:** I will describe a method for estimating the low-energy spectrum of locally symmetric spaces  $\Gamma \backslash G$ . The idea is to consider integrals of products of four automorphic forms  $F_1 F_2 F_3 F_4$  and apply the spectral decomposition to  $F_1 F_2$  and  $F_1 F_4$  to obtain an infinite set of spectral identities. These identities can be used to formulate linear programs which produce estimates on the low-energy spectrum. When  $G = PSL_2(\mathbb{R})$  and  $F_i$  are in the discrete series, we obtain nearly sharp upper bounds on the Laplacian spectral gap of hyperbolic 2-orbifolds. When  $G = PSL_2(\mathbb{C})$ , we obtain new bounds on the spectra of hyperbolic 3-manifolds. The same method has been used in the physics literature to prove estimates on the spectra of scaling dimensions in conformal field theories, and goes under the name conformal bootstrap. The talk will be based on <https://arxiv.org/abs/2111.12716> and work in progress with J. Bonifacio, P. Kravchuk and S. Pal.