Title: Diagram Varieties and a Geometric Approach to Verma Module Categorification

Speaker: Ruslan Maksimau (Univ. Paris-Cergy)

Abstract: This is a joint work with Catharina Stroppel (arXiv:2405.20262). Naisse and Vaz defined an extension of KLR algebras that categorify Verma modules by introducing an additional generator, the "floating dot," into the diagrammatic calculus. We provide a geometric interpretation of this extension as a convolution algebra in Borel-Moore homology. This talk is not about the categorification of Verma modules. It is about the geometric construction of the algebra that categorifies them. We introduce a geometric/combinatorial tool for constructing varieties, which we call diagram varieties. I will explain how diagram varieties naturally appear in this setting and how they provide a framework for understanding both the KLR algebra and its extension. In my talk, I will primarily discuss the sl2 version of the KLR algebra (the nil-Hecke algebra), but our approach works in general.