Various constructions of Mirkovic–Vilonen polytopes

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Consider a symmetrizable Kac–Moody algebra. In finite type, Mirkovic-Vilonen (MV) polytopes give nice combinatorial realizations of Kashiwara's crystals. These polytopes were originally defined using the geometry of the affine grassmannian, but they also arise naturally in several other contexts including PBW bases, quiver varieties and Khovanov–Lauda–Rouquier (KLR) algebras. These ideas make sense beyond finite type, giving several ways to extend the theory of MV polytopes. The story is nicest in affine type, and there all the constructions lead to identical combinatorial objects. I will explain as much of this as I can, focusing on recent work with Ben Webster developing the KLR algebra construction.

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