

Seminar: Mathematical Physics Seminar
When: Wed, April 6, 1:30-2:30pm on Zoom

Zoom Link: available at <https://www.math.purdue.edu/~ebkaufma/seminar.html>

Speaker: Jose Simental (MPIM Bonn)

Title: Braids, links and cluster algebras

Abstract: To a positive braid β on n strands we associate an affine algebraic variety $X(\beta)$ as the solution space of an incidence problem in the flag variety of $\mathrm{GL}_n(\mathbb{C})$. This variety has a number of nice properties, for example, it is smooth and admits smooth compactifications which correspond to different braid words for β . Many interesting varieties appearing in Lie theory, such as open Richardson varieties in type A , appear as varieties of the form $X(\beta)$ for special types of braids β .

I will define these varieties and explain some of their combinatorial and geometric properties. Most importantly, I will describe an \mathcal{A} -cluster structure on $X(\beta)$ defined using the formalism of algebraic weaves, a graphical calculus that allows us to find open tori in $X(\beta)$. In particular, this yields a cluster structure on type A Richardson varieties.

Finally and time permitting, I will elaborate on the relationship that $X(\beta)$ bears to the Legendrian link appearing as the Legendrian (-1) -closure of the braid β , and how a cluster structure on $X(\beta)$ may help in the understanding of the symplectic geometry of this link.

This talk is based on joint works with Roger Casals, Eugene Gorsky and Mikhail Gorsky.