RGM 2021 Poster Session Abstracts

Fraser Binns, Boston College

Title: Geography and Botany results for Knot Floer homology

Abstract: Link Floer homology is a powerful link invariant taking value in the category of graded vector spaces. Having defined such an invariant there are two natural questions one might ask; "which links can have the same invariants?" and "which vector spaces can arise as the link Floer homology of a link?" My poster addresses various specializations of these questions, and is based on joint work in progress with Subhankar Dey.

Jacob Caudell, Boston College

Title: Lens space surgeries, lattices, and the Poincaré homology sphere

Abstract: Although the cut-and-paste construction in 3-manifold topology known as Dehn surgery is straightforward to define, much of how Dehn surgery on a knot can change a 3-manifold has remained an open problem for the last century. Since Moser's classification of surgeries on torus knots in the 3-sphere almost 50 years ago, generations of low-dimensional topologists have developed a diverse array of techniques in order to more systematically understand knot surgeries. Here, we present some knots in the Poincaré homology sphere with surgeries to lens spaces and connected sums thereof. Using a lattice embedding obstruction together with input from Floer homology, following Greene's notion of a changemaker lattice, we remark on the extent to which these surgeries are unique.

Nicholas Cazet, University of California, Davis

Title: Vertex Distortion of Lattice Knots

Abstract: The vertex distortion of a lattice knot is the supre- mum of the ratio of the distance between a pair of vertices along the knot and their distance in the l1-norm. Inspired by Gromov, Pardon and Blair-Campisi-Taylor-Tomova, we show that results about the distortion of smooth knots hold for vertex distortion: the vertex distortion of a lattice knot is 1 only if it is the unknot, and there are minimal lattice-stick number knot conformations with arbitrarily high distortion.

Jesse Cohen, University of Oregon

Title: Lasagna modules and invariants of links in 3-manifolds

Abstract: Building on work of Morrison-Walker-Wedrich on extending Khovanov-Rozansky homology to invariants of links in boundaries of 4-manifolds, I will discuss how to similarly extend any sufficiently well-behaved link homology theory for links in the 3-sphere and extract an invariant of links in arbitrary closed 3-manifolds as a special case. Additionally, I will show that any functorial spectral sequence of such link homology theories taking values in a category of vector spaces lifts to a spectral sequence of the extended invariants.

Gianluca Faraco, Max Planck Institute for Mathematics

Title: Periods of Meromorphic differentials

Abstract: Let S be an oriented surface of genus g and n punctures. Periods of any meromorphic differential on S, with respect to a choice of complex structure, determine a representation $\chi:\Gamma_{g,n} \to\mathbbC$ where $\Gamma_{g,n}$ is the first homology group of S. We haracterise the representations that thus arise. This generalizes a classical result of Haupt in the holomorphic case. This is a joint work S. Chenakkod and S. Gupta.

Seppo Niemi-Colvin, Duke University

Title: Invariance of Knot Lattice Homology

Abstract: Lattice homology was developed by Némethi as an invariant for links of normal surface singularities developed out of computations for Heegaard Floer Homology, and then Ozsváth, Stipsicz, and Szabó defined knot lattice homology for generalized algebraic knots, which is known to compute knot Floer in some cases. I provide a proof that knot lattice is an invariant of the smooth knot type. As a part of that proof we also show that the smooth link type of a generalized algebraic link determines the singularity type used to make it.

Braeden Reinoso, Boston College

Title: Capping off open books and fractional Dehn twist coefficients

Abstract: Given an operation on an open book decomposition, (e.g. stabilization, general Murasugi sums, capping off a boundary component, etc.) a natural question is how that operation changes the fractional Dehn twist coefficients of the open book. I'll present some recent work on controlling the behavior of fractional Dehn twist coefficients under capping off. The construction builds on earlier work of Baldwin and Hedden-Mark, and uses Heegaard Floer homology with local coefficients.

Lorenzo Ruffoni, Florida State University

Title: Projective structures, representations, and ODEs on surfaces.

Abstract: In one of its easiest formulations, the Riemann-Hilbert correspondence deals with the relationship between ODEs on a surface and representations of its fundamental group. When a complex structure on the surface is fixed, a classical theory is available. However, not much is understood in the complementary case, i.e. when the type of the ODE is fixed, but the complex structure is allowed to vary. Projective structures on Riemann surfaces provide a geometric bridge between the analytic and the algebraic side of this picture. I will discuss how the geometric study of the moduli space of projective structures can lead to existence and (non-)uniqueness results for monodromy problems, including recent results for sl2-systems and hypergeometric equations.

Fan Ye, University of Cambridge

Title: Constrained knots in lens spaces

Abstract: In this poster, I introduce a special family of knots called constrained knots, which generalizes 2-bridge knots in the 3-sphere and simple knots in lens spaces. I describe a parameterization of constrained knots by five parameters (p,q,l,u,v), based on which there is a complete classification. For any constrained knot K, the knot Floer homology HFK^hat(K) and the instanton knot homology KHI(K) are isomorphic, which verifies many examples of a conjecture made by Kronheimer and Mrowka. I also show the relation between constrained knots and orientable 1-cusped hyperbolic manifolds. Some results are joint work with John A. Baldwin and Zhenkun Li.