

Introduction to Research Interests and Projects

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Research Interests

Areas I'm interested in include: 3-manifolds, 4-manifolds, knots and links in 3-manifolds, surfaces in 4-manifolds, and 3-orbifolds.

Tools I use include: the various versions of Floer theory (Heegaard Floer, bordered Floer, knot Floer, etc) and Khovanov homology.

Double branched covers of links

In current work with Marco Marengon, we study the d -invariants of double branched covers of links that arise from certain plumbing trees, and relate it to information about the links (specifically their signatures).

d -invariants are rational numbers that are defined for rational homology 3-spheres (equipped with spinc-structures), using Heegaard-Floer theory.

The links associated to these plumbing trees have double branched covers that are L-spaces.

Conjecture: If L is any link in S^3 with $\Sigma_2(L)$ an L-space, then $d(\Sigma_2(L), \mathfrak{s}) = -\frac{1}{4}\sigma(L, \omega_{\mathfrak{s}})$.

Satellite knots

In a joint project with Ina Petkova (2020), we used **bordered Heegaard Floer theory** to study certain topological properties of **twisted Mazur pattern satellite knots** $P_n(K)$:

- ▶ **Heegaard Floer thickness**,
- ▶ **3-genus**,
- ▶ **fibredness**, and
- ▶ whether $P_n(K)$ admits **cosmetic surgeries**.

Future work: Use bordered Floer theory to understand when these and other satellite knots bound properly embedded disks in punctured 4-manifolds.