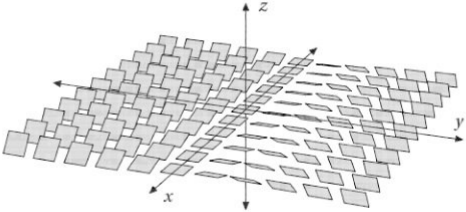
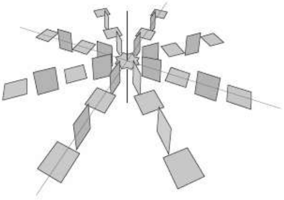
Rima Chatterjee
University of Cologne

Braids, ICERM





My research interests include-

- Contact Geometry and Legendrian Knots.
  - Classfication problems.
  - Structure problems.
- Interaction between Contact Geometry and Heegaard Floer Theory.

Classification of Knots in Overtwisted Manifolds

There are two types of knots in an overtwisted contact manifold–namely loose(with overtwisted complemement) and non-loose (with tight complement).

Theorem (C.,2020)

Null-homologous Legendrian links can be completely classified by their classical invariants (up to contactomorphism).

Theorem (C., 2020)

If L is a null-homologous loose Legendrian link, then the support genus vanishes.

Theorem (C., 2020)

There are examples of non-loose links with support genus zero.

Classification of knots in Overtwisted manifolds

How can one classify non-loose knots in overtwisted manifolds?

Few non-loose knot/link types are completely classified in overtwisted S^3–

- Non-loose unknots (Eliashberg-Fraser)
- Non-loose torus knots (Etnyre-Min-Mukherjee, in preparation)
- Non-loose Hopf links (Geiges-Onaran)

What can we say about other manifolds?

Theorem (C-Geiges-Onaran, work in progress)

Classification of Hopf links in lens spaces.

Structure Theorem of knots in overtwisted manifolds

Structure theorem of Legendrian knots $\rightarrow$ behavior of Legendrian knots under topological operations.

Theorem (C-Etnyre-Min-Mukherjee)

Suppose L be a non-loose representative of a knot type $\mathcal{K}$ in (M, ξ). If $\frac{q}{p} > \mathrm{tb}(L)$ for $q, p > 0$, $L_{p,q}$ is non-loose in (M, ξ).

What about $\frac{q}{p} \leq \mathrm{tb}(L)$?

Theorem (C-Etnyre-Min-Mukherjee)

Suppose L be a non-loose representative of a knot type $\mathcal{K}$ in (M, ξ) such that L has non-loose transverse push off. Then if $\frac{q}{p} \leq \mathrm{tb}(L)$, then $L_{p,q}$ is non-loose in (M, ξ).

Legendrian knots and Heegaard Floer theory

- Ozsváth, Szabó and Thurston defined GRID Invariants using combinatorial knot Floer theory.
- Baldwin-Lidman-Wong proved their effectiveness in obstructing decomposable Lagrangian cobordism (2019).
- Vela-Vick–Wong extended these invariants to the cyclic branched cover and call them "transverse invariant"(2019).
- This transverse invariant in the cyclic branched cover can obstruct decomposable Lagrangian cobordism between Legendrian links in the base space. (C., 2020)