

Chord diagrams, topological quantum field theory, and the sutured Floer homology of solid tori

Daniel Mathews
(Stanford University)

April 17, 2009

I will talk about recent investigations of contact elements in the sutured Floer homology of solid tori, as part of the $(1 + 1)$ -dimensional TQFT defined by Honda-Kazez-Matic. The \mathbb{Z}_2 sutured Floer homology vector spaces in this case form a "categorification of Pascal's triangle", a triangle of vector spaces, with contact elements corresponding to chord diagrams and forming distinguished subsets of order given by the Narayana numbers. Sutured Floer homology in this case reduces to the combinatorics of chord diagrams — so that this talk is actually very elementary.

I will show that there are natural "creation and annihilation operators" which allow us to define a QFT-type basis consisting of contact elements; and contact elements are in bijective correspondence with comparable pairs of basis elements with respect to a certain partial order, and in a natural and explicit way. I will explain how we can use this to extend Honda's notion of contact category to a 2-category, and possibly a 3-category.

3:45 p.m.
Math 520
Columbia University