

Fibered ribbon knots vs. major 4D conjectures

Feb 20 & 22, 2024

4:00-5:30 pm

Harvard University Science Center Hall A & via Zoom

Harvard Center of Mathematical Sciences and Applications

Math Science Lectures in Honor of Raoul Bott

Feb. 20, 2024

Fibered ribbon knots and the Poincaré conjecture

A knot is “fibered” if its complement in S^3 is the total space of a bundle over the circle, and ribbon if it bounds a smooth disk into B^4 with no local maxima with respect to radial height. A theorem of Casson-Gordon from 1983 implies that if a fibered ribbon knot does not bound any fibered disk in B^4 , then the smooth 4D Poincaré conjecture is false. I’ll show that unfortunately (?) many ribbon disks bounded by fibered knots are fibered, giving some criteria for extending fibrations and discuss how one might search for non-fibered examples.



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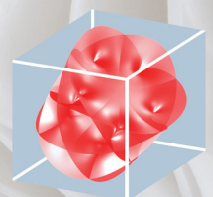
Feb. 22, 2024

Fibered knots and the slice-ribbon conjecture

The slice-ribbon conjecture (Fox, 1962) posits that if a knot bounds any smooth disk into B^4 , it also bounds a ribbon disk. The previously discussed work of Casson-Gordon yields an obstruction to many fibered knots being ribbon, yielding many interesting potential counterexamples to this conjecture — if any happy to bound a non-ribbon disk. In 2022, Dai-Kong-Mallick-Park-Stoffregen showed that unfortunately (?) many of these knots don’t bound a smooth disk into B^4 and thus can’t disprove the conjecture. I’ll show a simple alternate proof that a certain interesting knot (the $(2,1)$ -cable of the figure eight) isn’t slice and discuss remaining open questions. This talk is joint with Paolo Aceto, Nickolas Castro, JungHwan Park, and Andras Stipsicz.



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