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Seiberg-Witten theory, homotopy-coherent group actions, and exotic Dehn twists

Abstract

Seiberg-Witten theory is a powerful invariant of 4-manifolds, used to detect several subtle exoticness phenomena in dimension 4. Recently there has been a significant progress on understanding the homology groups of diffeomorphism groups of 4-manifolds, possibly with boundary, via a family version of Seiberg-Witten theory. In this talk, we will use this theory for families of 4-manifolds over BZ_p to show that equivariant Froyshov invariants of Baraglia-Hekmati give obstruction to smoothly extending a Z_p action on a homology 3-sphere to a homotopy coherent Z_p-actions on rational homology 4-balls bounding it. As a result, we will prove that, for a vast number of Seifert fibered homology spheres, there exists a negative-definite 4-manifold bounding it in which the Dehn twist along the boundary is infinite-order exotic. This is an ongoing joint work with JungHwan Park and Masaki Taniguchi.