

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

A Symplectic Isotopy of a Dehn Twist on $\mathbb{C}P^n \times \mathbb{C}P^{n+1}$

By

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We extend a result of Corti-Smith by constructing a Lefschetz fibration with exactly one singular fiber and with non-singular fibers symplectically isotopic to $(\mathbb{C}P^n \times \mathbb{C}P^{n+1}, \sigma_\mu)$ where σ_μ is the product symplectic form $\sigma_{\mathbb{C}P^n} + \mu \sigma_{\mathbb{C}P^{n+1}}$ on $\mathbb{C}P^n \times \mathbb{C}P^{n+1}$, n is any non-negative integer and $\mu > 1$; here $\sigma_{\mathbb{C}P^n}$ and $\sigma_{\mathbb{C}P^{n+1}}$ are normalized Fubini-Study forms. We compute the vanishing cycle in the non-singular fibers using a large Darboux chart on the total space of the fibration that we obtain by symplectically embedding it into a toric manifold. We exhibit a symplectomorphism between a specific non-singular fiber and $(\mathbb{C}P^n \times \mathbb{C}P^{n+1}, \sigma_\mu)$ that sends the vanishing cycle in the fiber to a well-known Lagrangian sphere L^μ . In particular, the generalized Dehn twist along L^μ is symplectically isotopic to the identity for all $\mu > 1$. In addition, we show that this isotopy fixes a complex hypersurface in $\mathbb{C}P^n \times \mathbb{C}P^{n+1}$.

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Program: Mathematics

Dissertation Advisor: Dusa McDuff