

# Lefschetz fibrations on cotangent bundles and Lagrangian submanifolds

Joseph Johns  
(New York University)

April 17, 2009

Given a Morse function  $f : N \rightarrow \mathbb{R}$  I will describe a Lefschetz fibration  $\pi : E \rightarrow \mathbb{C}$  which models the complexification of  $f$  on the disk cotangent bundle  $D(T^*N)$ . I will then describe a program in progress for studying closed exact Lagrangian submanifolds of  $T^*N$  using  $\pi$ . The idea is to translate questions about Lagrangian submanifolds into questions about representations of certain quivers, following Seidel's work on  $T^*S^n$ .

If time permits I will discuss the following offshoots of this program:

1. The program yields a conjectural bridge between The analysis of  $Fuk(T^*N)$  by Nadler-Zaslow, using constructible sheaves, and that of Seidel, using Picard-Lefschetz theory.
2. In a more geometric vein the construction of  $\pi : E \rightarrow \mathbb{C}$  suggests a way to generalize matching paths from spheres to more general manifolds.

1:10 p.m.  
Math 520  
Columbia University