

ABSTRACTS

First Illinois-Indiana Symplectic Geometry Conference Indiana University Purdue University Indianapolis

March 15–16, 2008.

All talks are in the Science Auditorium, LD-010, in the basement of the School of Science (LD) building.

Dusa McDuff. *“Some new 6-dimensional Hamiltonian S^1 manifolds.”*

I will construct some Hamiltonian S^1 manifolds M with $H^2(M) = \mathbb{Z}$ whose existence was first proposed by Sue Tolman. The reduced spaces are one point orbifold blow ups of weighted projective planes. The idea of the proof is to resolve the orbifold singularities and so reduce the problem to one concerning the 7 or 8 point blow up of the projective plane. I will try to explain all this in a very elementary way.

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Yi Ni. *“Heegaard Floer homology and fibred three-manifolds.”*

Heegaard Floer homology is a theory introduced by Ozsvath and Szabo as an analogue to Seiberg-Witten theory. For knots in 3-manifolds, this theory is refined to a filtered version, called knot Floer homology. Ozsvath and Szabo conjectured that knot Floer homology detects fibred knots in the three-sphere. In this talk, we will discuss a proof of this conjecture, based on the works of Paolo Ghiggini and of the speaker. In fact, one can show that Heegaard Floer homology detects whether a 3-manifold is fibred, namely, whether it is a surface bundle over the circle. Some applications will also be discussed.

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John Etnyre. *“Duality exact sequences in contact homology.”*

I will discuss a “duality” among the linearized contact homology groups of a Legendrian submanifold in certain contact manifolds (in particular in Euclidean $(2n + 1)$ -space). This duality is expressed in a long exact sequence relating the linearized contact homology, linearized contact cohomology and the ordinary homology of the Legendrian submanifold. One can use this structure to ease difficult computations of linearized contact homology in high dimensions and further illuminate the proof of cases of the Arnold Conjecture for the double points of an exact Lagrangian in complex n - space.

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Ko Honda. *“Contact structures, Heegaard Floer homology and triangulated categories.”*

The goal of this talk is to associate a category $\mathcal{C}(\Sigma)$ to a surface Σ , called the *contact category* and constructed from contact structures on $\Sigma \times [0, 1]$. The category $\mathcal{C}(\Sigma)$ satisfies many of the axioms of a triangulated category, and, in particular, has distinguished triangles which we call the *bypass exact triangles*. We then describe an “exact” functor from $\mathcal{C}(\Sigma)$ to the category of vector spaces, via Heegaard/sutured Floer homology.

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Octav Cornea. *“Narrow and wide Lagrangian submanifolds.”*

I will describe some new structural results for monotone Lagrangian submanifolds - width estimates, homological rigidity as well as intersection statements. The proofs are based on algebraic techniques which allow one to use the the uniruling of the ambient symplectic manifold to deduce uniruling results of the Lagrangian submanifolds. Joint work with Paul Biran.

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Denis Auroux. *“Special Lagrangian tori and mirror symmetry.”*

This talk will focus on a geometric proposal for constructing the mirror of a compact Kähler manifold equipped with an anticanonical divisor, extending the Strominger-Yau-Zaslow conjecture beyond the Calabi-Yau case. The mirror manifold is constructed as a (complexified) moduli space of special Lagrangian tori, and the Landau-Ginzburg superpotential is defined by a weighted count of holomorphic discs. We will give examples, both in the toric and in the non-toric setting, to illustrate the construction and the manner in which “instanton corrections” arise from exceptional discs and wall-crossing phenomena.