Titles & abstracts:

Nicholas Addington

Title: New Derived Symmetries of some Hyperkaehler Varieties

We construct new autoequivalences of the derived categories of the Hilbert
scheme of n points on a K3 surface and the variety of lines on a smooth
cubic 4-fold. The second example and n=2 in the first use the theory of
spherical functors; to deal with n>2 in the first example we develop a
theory of P-functors. We conjecture that the same construction yields an
autoequivalence for any moduli space of sheaves on a K3 surface.

Frederic Campana

Title: Symplectic manifolds as obstructions to the projectivity
of compact Kaehler Manifolds

Abstract: The role of holomorphic two-forms as obstructions to projectivity
of a compact Kaehler manifold X is since long well-known from a famous
theorem of Kodaira. A Kaehler version of the minimal model program would
imply that any such X should be (holomorphically) symplectic, or a torus,
if 'simple' (which means: of dimension at least 2, and not covered by
closed suvarieties of pure intermediate dimension). This would imply an
extremely short decomposition of any such X in terms of Tori, symplectic,
and projective manifolds.

Sergey Cherkis

Tittle: ALH Manifolds as Moduli Spaces

Abstract:
We explore a number of examples of hyperkaehler manifolds of real dimension
four and lower than quadratic volume growth. These are realized as moduli
spaces of monopoles or as moduli spaces of vacua of five-dimensional
quantum field theories. The moduli space realization of these spaces
allows us to compute their asymptotic metrics and to study their relations
to other hyperkaehler spaces.

Marco Gualtieri

Title: Generalized Kahler deformations

Abstract: TBA

Nigel Hitchin

Title: The hyperholomorphic line bundle

Abstract: A hyperkahler manifold with a circle action
preserving just one complex structure has associated with it a
hyperholomorphic line bundle which forms
the starting point for the HK/QK correspondence. The talk will give a
description of this as a holomorphic bundle on twistor space, with
particular reference to metrics on cotangent bundles and the moduli space
of Higgs bundles.

Daniel Huybrechts

Title: Quartic K3 surfaces vs. abelian tenfolds

Abstract: TBA

Jun-Muk Hwang

Title: Webs of Lagrangian tori in projective symplectic manifolds

Abstract: This is a report on my jointwork with Richard Weiss,
which proves that a web of Lagrangian fibration in a projective symplectic
manifold defines an almost holomorphic map.
There are two ingredients of the proof: a group-theoretic result
on the behavior of the subgroups of the monodromy group
associated to a web of submanifolds and an integrability result
on pairs of Lagrangian foliations arising from proper Lagrangian
fibeations.

Dmitry Kaledin

Title: A canonical hyperkahler metric on the cotangent bundle

Abstract: We are going to describe a construction of a completely canonical hyperkahler metric on the neighborhood of the zero section in the cotangent bundle to a Kahler manifold. The construction is due independently to Birte Feix and myself, and it is actually 15 years old; however, in view of recent developments, perhaps it is worth revisiting.

Claude LeBrun

Title: Gravitational Instantons, Bubbling Modes, and the Geometrization of 4-Manifolds

Abstract: Given a smooth compact manifold, one would like to equip it with a Riemannian metric which is "as flat as possible," as measured by some natural curvature functional. Dimension 4 turns out to be completely exceptional for this class of problems, and phenomena that only occur in four dimensions play a dominant role in the resulting theory. This lecture will describe the way that complete, non-compact hyper-Kahler manifolds play a key role in this setting, via gluing in and bubbling off of gravitational instantons. I will also discuss the important role played by more general scalar-flat Kahler manifolds, and indicate some open problems related to the classification of such spaces.

Manfred Lehn

Title: Twisted cubics on a general cubic fourfolds

Abstract:
I will report on work in progress with Christian Lehn,
Christoph Sorger and Duco van Straten. Starting from the
moduli space of twisted cubics on a general cubic fourfold
we propose a construction of a family of 8-dimensional
projective symplectic manifolds. The relation to Hilb^4
of a K3-surface is not yet completely clear.

Emanuele Macri

Title: MMP for moduli spaces of sheaves on K3 surfaces and Cone Conjectures

Abstract: We report on joint work in progress with A. Bayer on how one can use wall-crossing techniques to study the birational geometry of a moduli space M of Gieseker-stable sheaves on a K3 surface X. In particular:

(--) We will give a "modular interpretation" for all minimal models of M.
(--) We will describe the nef cone, the movable cone, and the effective cone
of M in terms of the algebraic Mukai lattice of X.
(--) We will establish the so called Tyurin/Bogomolov/Hassett-Tschinkel/Huybrechts/Sawon
Conjecture on the existence of Lagrangian fibrations on M.

Laurent Manivel

Title: Fano fourfolds and EPW sextics.

Abstract: The Fano variety of lines on a cubic fourfold is
well-known to be a holomorphic symplectic variety, by the
classical work of Beauville and Donagi. There is a similar
construction, starting from a Fano fourfold of degree ten,
that yields a double EPW sextic: another famous example of
holomorphic symplectic variety, first discovered by Mukai and
O'Grady. I will discuss the many facets of this construction,
including the unexpected fact that the derived category of
a Fano fourfold of degree ten contains a two-dimensional
Calabi-Yau sub-category.

Dmitri Markouchevitch

Title: Compactifying Lagrangian fibrations

Abstract: In the talk I will speak on recent advancements in the problem of
compactification of Lagrangian fibrations in intermediate Jacobians of Fano
threefolds.

Daisuke Matsushita

Title : On isotropic divisors of the Hilbert scheme of K3 surfaces

Abstract : Let X be the Hilbert scheme of a K3 surface parametrizing length
n scheme and L an isotropic divisor on X. If n is greater than 5, n-1 is
odd and n-1 has no square factors, then there exists a projective
irreducible symplectic manifold X' which is birational to X and the proper
transform L ' of L is free. Moreover L' defines a Lagrangian fibration over
the projective space which is deformation equivalent to the compactifield

Jacobian of the linear system on K3 surface.

Gregory Moore

Title: BPS Degeneracies and Hyperkahler Geometry

Abstract: Part 1:
Given a Higgs bundle on a Riemann surface C the method of spectral networks
allows one to derive a set of ``BPS degeneracies‚Äô‚Äô satisfying the 2d4d
wall-crossing formula - a version of the Kontsevich-Soibelman wall-crossing
formula. Using this data as input in a system of integral equations one can
construct explicit solutions to the Hitchin equations on C, together with
thehyperkahler metric on the moduli space of solutions to the Hitchin
equations.

Part 2:
The semiclassical description of the same BPS degeneracies involves
zeromodes of Dirac operators on monopole moduli spaces, and therefore we
learn about L2-harmonic spinors on these spaces.

Yoshinori Namikawa

Title: Symplectic varieties of complete intersection
and contact geometry

Abstract:
Let (X, ω) be a singular affine symplectic
variety embedded in an affine space as a complete
intersection of homogeneous polynomials. Assume moreover
that ω is also homogeneous. Then (X, ω)
is isomorphic to the nilpotent variety (N, ω_{KK})
of a semisimple complex Lie algebra g together with
the Kostant-Kirillov form ω_{KK}.

Keiji Oguiso

Title: No cohomologically trivial non-trivial automorphism of generalized
Kummer manifold

Abstract: We prove that the natural representaion, on the total Betti
cohomolgy group, of the automorphism group of a hyperk\"ahler manifold
deformation equivalent to a generalized Kummer manifold is faithful.

Besides its own interest in hyperkaehler geometry, this is much inspired
by a question of Professor Dusa McDuff, while the result is an answer in
negative direction.

Daniel Persson

Title: Wall-crossing and the QK/HK correspondence

Abstract: The QK/HK correspondence relates a quaternion-
Kahler manifold M with a circle isometry¬†to a hyperkahler
manifold M' of the same real dimension and with a different
circle action. The correspondence furthermore ensures that
M' comes equipped with a hyperholomorphic line bundle. I will
describe a physical realization of this correspondence in the
context of Calabi-Yau compactifications of string theory.
A key role in the construction is played by the (motivic) Kontsevich-
Soibelman wall-crossing formula and the twistorial descriptions
of hyperkahler and quaternion-Kahler manifolds.

Yuri Tschinkel

Title: "Arithmetic aspects of K3 surfaces and their higher-dimensional
analogs".

Abstract: I will discuss some arithmetic questions that arise in the study
of K3 surfaces (joint with B. Hassett).

Misha Verbitsky

Title: Local structure of twistor spaces

Abstract: Let M be a hyperkahler manifold, and Tw(M)
its twistor space, fibered over CP^1. Consider
a section S of this fibration, that is, a
rational curve, isomorphically projecting
to CP^n, and let U be the tubular neighbourhood
of S inside Tw(M). For any holomorphic line bundle
bundle L on Tw(M), the space $\Gamma_U(L)$ of
sections of L on U is finite-dimensional. I prove
that $\Gamma_U(L)$ is in fact independent from
the choice of S and U. This allows us to define
"the Moishezon structure" on the twistor space.

The twistor spaces for manifolds obtained by
hyperkahler reduction (such as quiver varieties)
are Moishezon, and the twistor spaces for
compact hyperkahler manifolds are not Moishezon.

Claire Voisin

Title: Chow groups of K3 surfaces and hyper-Kaehler manifolds

Abstract: A few years ago, Beauville and myself proved that an algebraic K3
surface S carries a canonical 0-cycle (defined modulo rational equivalence)
satisfying very restrictive properties (it is proportional to the second
Chern class of S, and to the intersection of any two divisors on S).
This 0-cycle appeared recently in works of Huybrechts who showed that
if S has Picard rank at least 2, the second Chern class of any rigid
vector bundle on S is also a multiple of this cycle. I will give a new
characterization of this 0-cycle which implies easily that the last result
holds without any assumption on the Picard number. I will also explain
recent ideas of O'Grady generalizing the statements above.

Kota Yoshioka

Title: Moduli of stable sheaves on abelian surfaces.

Abstruct: I will explain that Bridgeland stability condition is useful
to study the moduli of stable sheaves on abelian surfaces.