

The UIC Algebraic Geometry Seminar

STRANGE DUALITY ON THE PROJECTIVE PLANE AND COHOMOLOGY OF HILBERT SCHEMES OF POINTS

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We will discuss the strange duality conjecture on smooth projective surfaces and we will focus on an important example on the projective plane, closely related to the problem of the nondegeneracy of the Barth morphism. The technique used to attack the conjecture in this case, due to Le Potier-He and Danila, uses moduli spaces of coherent systems in order to interpolate the moduli space M_u , of semistable sheaves of rank 2, degree 0 and second Chern class n , with a Hilbert scheme $\mathbb{P}_2^{[m]}$ of points in \mathbb{P}_2 ; this procedure allows to reduce the computation of the space of global sections of the determinant line bundle on M_u by working out an hypercohomology spectral sequence on the Hilbert scheme whose terms are of the form $H^p(\mathbb{P}_2^{[m]}, S^q L^{[m]})$, where $L^{[m]}$ is the tautological bundle on $\mathbb{P}_2^{[m]}$ associated to a certain line bundle L on \mathbb{P}_2 . Danila's results on the cohomology of $S^q L^{[m]}$ yield the strange duality for $0 \leq n \leq 19$.

We will show how to improve and generalize Danila's results on the cohomology of the Hilbert scheme of points on a surface X with values in representations of tautological bundles. By making use of the derived McKay correspondence of Bridgeland-King-Reid, adapted by Haiman in the case of the Hilbert scheme $X^{[m]}$, we prove general formulas for the cohomology of $X^{[m]}$ with values in the double tensor power $L^{[m]} \otimes L^{[m]}$ and general exterior powers $\Lambda^k L^{[m]}$ of tautological bundles.

SEO 636

Thursday, September 20th
4:00 p.m.

<http://www.math.uic.edu/~coskun/f2007alggeom.html>