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Anti-symplectic involutions of the Hilbert scheme of points on a symplectic surface

Let S be a smooth quasi-projective complex surface. The Hilbert scheme of n points in S, denoted $S^{[n]}$, is a smooth $2n$-dimensional variety which contains the variety of n distinct unordered points as a dense open subvariety.

If S is a symplectic, then $S^{[n]}$ is naturally symplectic. Given an anti-symplectic involution of S, there is an induced involution on $S^{[n]}$ whose fixed point locus is a smooth Lagrangian submanifold. In this talk I explain how to calculate its cohomology and mixed Hodge structure. For the special case $S = \mathbb{C}^2$, this is done using a Morse theory argument borrowed from Ellingsrud-Stromme. For the general case, we adapt an approach due to Gottsche-Soergel involving perverse sheaves.