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Citation for Dr Nick Sheridan

Dr Nick Sheridan of the University of Edinburgh is awarded a Whitehead Prize for his groundbreaking contributions to homological mirror symmetry and the structure of Fukaya categories.

Homological mirror symmetry relates symplectic geometry on one manifold with algebraic geometry on a different 'mirror' manifold. The symplectic manifold enters through its Fukaya category, a relatively new and intractable object built out of Floer theory and intersection properties of Lagrangian submanifolds; the algebraic mirror enters through its more classical and better-studied derived category of coherent sheaves. Sheridan's papers provide sophisticated computations of Fukaya categories, probe and elucidate their structure, and reveal surprising connections through applications.

Sheridan proved homological mirror symmetry for Calabi-Yau and Fano hypersurfaces in projective space, the former settling a decades-old conjecture due to Kontsevich. He later established a versality theorem for Fukaya categories, giving a general template for proving homological mirror symmetry, which he applied (with Smith) to Greene-Plesser mirror pairs. This yielded a new symplectic interpretation of Kuznetsov's category of a cubic four-fold and had deep applications to symplectic mapping class groups of K3 surfaces. He showed (with Ganatra and Perutz) how classical closed-string mirror symmetry, and the famous prediction from string theorists for the numbers of rational curves on the quintic threefold, can be formally deduced from homological mirror symmetry by matching up canonical connections on cyclic homology of the corresponding categories. This is a sophisticated application of ideas from non-commutative Hodge theory. His recent work (with Abouzaid, Ganatra and Iritani) applies methods from tropical geometry to shed new insight into the mysterious Gamma-class of the Fukaya category and the appearance of Riemann zeta values in period integrals.