Speaker: **Roberts, Justin**
Title: *Rozansky-Witten theory*
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Abstract: In 1996 Rozansky and Witten described a new family of $(2+1)$-dimensional topological quantum field theories, quite different from the now familiar Chern-Simons theories. Instead of starting from a compact Lie group, one starts with a hyperkähler manifold X^{4n}; the partition function (a topological invariant) for a closed 3-manifold M is then expressed as an integral over the space of all maps from M to X. Further analysis shows that these invariants amount to evaluations of the universal finite-type invariant of Le, Murakami and Ohtsuki, using weight systems derived purely from the hyperkähler manifold X.

I will explain the geometrical origin of these weight systems and then describe (joint work with Simon Willerton and Justin Sawon) a precise analogy between hyperkähler manifolds and Lie algebras, the connections with Vassiliev theory, and the rigorous construction of the TQFT arising from X. The flavour of the theory is appealingly algebro-geometrical: whereas constructions of Chern-Simons theory start from the category of representations of a quantum group, Rozansky-Witten theory turns out to be based on the derived category of coherent sheaves on X.