## Jonathan Robbins (Bristol)

**Onsager model for biaxial liquid crystals / Nonabelian homotopy invariants and the Dirichlet energy of tangent director fields**

I'll discuss work on two problems related to liquid crystals.

The first concerns phase transitions in the Onsager model for biaxial liquid crystals. Building on the previous work of Fatkullin and Slastikov for the (uniaxial) Maier-Saupe interaction and using results from equivariant bifurcation theory, we obtain some rigorous results for the phase diagram for the (biaxial) London interaction.

*This is joint work with Valeriy Slastikov.*

The second problem is motivated by nematic liquid crystals in confined polyhedral geometries. We consider the Dirichlet energy of S^2-valued maps on a spherical polygon P which map the edges of P into the geodesics which contain them. In the case where P is an octant, we calculate the infimum Dirichlet energy as a function of homotopy type. For nonconformal homotopy classes, this turns out to depend on an invariant of the (nonabelian) fundamental group of the n-times punctured sphere.

*This is joint work with Apala Majumdar and Maxim Zyskin.*