**LMS   SINGULARITY   DAY**

**Liverpool**

**15 December 2016**

**room G16, Mathematics building**

***Programme:***

12:30 -- 1:30 Lunch

1:30 -- 2:30 Nicola Pagani (Liverpool)

                    Wall-crossing on compactified universal Jacobians

2:30 -- 3:30 James Montaldi (Manchester)

                    An application of the versal deformation of the '3 lines singularity' to classical

                    mechanics

3:30 -- 4:00 Tea

4:00 -- 5:00 Oleg Karpenkov (Liverpool)

                    Configuration spaces of tensegrities

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***Talk Abstracts:***

**Nicola Pagani**     Wall-crossing on compactified universal Jacobians

The last 20 years have seen huge developments in the enumerative geometry of the moduli spaces of stable curves. In this talk, we will discuss the beginning of a similar programme for the universal Jacobian parameterizing line bundles on stable curves. The universal Jacobian admits many natural compactifications, each of which should play an important role in the enumerative geometry, thus giving rise to interesting wall-crossing phenomena.  We will discuss our first results in this research programme and their application. We have an explicit picture of the combinatorics of the stability space and of the walls that govern all different compactifications, and we understand how the wall-crossing works for codimension-1 cycles.  This is research in progress with Jesse Kass (South Carolina).

**James Montaldi**     An application of the versal deformation of the '3 lines singularity' to

                                classical mechanics

The famous problem of the rotating free rigid body allows for a reduction to Euler's equations, a dynamical system in R^3. The set of equilibria of this equation form the three coordinate axes in R^3, which is a determinantal singularity (and not a complete intersection).  There are interesting perturbations of this system (corresponding to the addition of gyroscopic terms) and the resulting deformation is also determinantal. We describe this (well-known) deformation and its consequence for the dynamics, and then proceed to discuss the stability of these perturbed equilibria, which becomes a problem in deforming the critical points of a function on a singular variety.

Reference: Bifurcations of relative equilibria near zero momentum in Hamiltonian systems with spherical symmetry.  (2014) http://dx.doi.org/10.3934/jgm.2014.6.237

**Oleg Karpenkov**    Configuration spaces of tensegrities

In this talk we consider a natural stratification of the configuration space of tensegrities. We discuss several results about the structure of the configuration space of (mostly two-dimensional) tensegrities with a small number of points. In particular we briefly describe the technique of surgeries that is used to find geometric conditions for tensegrities. We conclude the talk with several open problems related to the stratification of the space of tensegrities.