**LMS SINGULARITY DAY**

**Liverpool**

**16 December 2015**

**room G16, Mathematics building**

***Programme:***

11:00 -- 12:00 Oleg Karpenkov (Liverpool)

                   Finite and infinitesimal flexibility of semidiscrete surfaces

12:00 -- 1:00 Juan José Nuño Ballesteros (Valencia)

                    Equisingularity of map germs from a surface to the plane

1:00 -- 2:00 Lunch

2:00 -- 3:00 David Mond (Warwick)

                  Invariants of the disentanglement of a map-germ (C^3,0)--> (C^4,0)

3:00 -- 4:00 Anna Pratoussevitch (Liverpool)

                  Traces and discreteness for certain subgroups of PU(2,1)

4:00 -- 4:30 Tea

4:30 -- 5:30 Victor Goryunov (Liverpool)

                  On planar caustics

***The meeting is supported by the LMS Scheme 3 grant 31437.***

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***Talk Abstracts:***

**Oleg Karpenkov**

In this talk we will discuss infinitesimal and finite flexibility for generic semidiscrete surfaces. These surfaces are combined of smooth ribbons, they are in a sense limit shapes of quadrilateral graphs. It turns out that a generic 2-ribbon semidiscrete surface has one degree of infinitesimal and finite flexibility, which leads to construction of curious flexible mechanisms. Generic n-ribbon surfaces with n>2 do not possess any flexibility at all. Addressing this, we show a necessary condition for infinitesimal flexibility of a 3-ribbon surface.

**Juan José Nuño Ballesteros**

Let (X,0) be an ICIS of dimension 2 and let f: (X,0) --> (C^2,0) be a map germ with an isolated instability. We look at the invariants that appear when X\_s is a smoothing of (X,0) and f\_s: X\_s --> C^2 is a stabilization of f. We find relations between these invariants and also give necessary and sufficient conditions for a 1-parameter family F to be Whitney equisingular. As an application, we show that a family (X\_t,0) is Zariski equisingular if and only if it is Whitney equisingular and the numbers of cusps and double folds of a generic linear projection do not depend on t.

**David Mond**

This is a very concrete talk focusing on a single example. We calculate the ranks of homology groups of spaces associated with the disentanglement of a map germ (C^3,0) --> (C^4,0). The talk will therefore give an introduction to the geometry of such map-germs. Some of the spaces involved have non-isolated singularities, and a number of classical and not-so-classical techniques must be brought to bear. After using every technique we can think of, some key questions remain, and it seems that some new ideas are called for. We end by describing what we think is needed. (Work in progress by Isaac Bird and David Mond)

**Anna Pratoussevitch**

While discrete subgroups of the group PSL(2,R)=PU(1,1) of isometries of the real hyperbolic plane are classified, the discreteness of subgroups of the group PU(2,1) of isometries of the complex hyperbolic plane is not well understood. We discuss a class of subgroups of PU(2,1) generated by complex reflections and show some non-discreteness results by considering the traces of elements in the group.

**Victor Goryunov**

We study local invariants of planar caustics, that is, invariants of Lagrangian maps from surfaces to R^2 whose increments in generic homotopies are determined entirely by diffeomorphism types of local bifurcations of the caustics. Such invariants are dual to trivial codimension 1 cycles supported on the discriminant in the space L of the Lagrangian maps.

We obtain a description of the spaces of the discriminantal cycles (possibly non-trivial) for the Lagrangian maps of an arbitrary surface, both for the integer and mod2 coefficients. For the majority of these cycles we find homotopy-independent interpretations which guarantee the triviality required. As an application, we use the discriminantal cycles to establish non-contractibility of certain loops in L. (This is a joint work with Katy Gallagher)