Svenska matematikersamfundets höstmöte i Linköping, 18-19 november 2011

Program med abstracts

Fredag 18 november

13.15-14.05 Tobias Ekholm, Uppsala: *Lagrangian immersions with a single double point*
Abstract: We show the following: if K is an even dimensional manifold, $\dim(K) > 4$, with Euler characteristic not equal to -2 that admit an exact Lagrangian immersion into $\mathbb{C}^n$ with one transverse self intersection point and no other self intersections then K is diffeomorphic to the standard sphere. In particular, the result rules out Lagrangian immersions of exotic spheres with only one double point even though such spheres admit Morse functions with only two critical points. The results discussed are joint work with Ivan Smith.

14.15-14.35 Ornella Greco, KTH: *The h-vector of the union of two sets of points in the projective plane*
Abstract: Given the h-vectors associated to two disjoint sets of points in the projective plane, X and Y, we wonder which are the possible h-vectors for the union of those sets. To do this, we give first some bounds that the resulting h-vectors have to satisfy, then we give a way to construct graphically a range of possible h-vectors, and finally we conjecture that, in this way, we get all the possibilities. This talk is based on a joint work with M. Mateev and C. Söger, done during the summer school Pragmatic 2011.

14.45-15.15 Kaffe

15.15-15.35 Nils Rustam, Linköping: *Analysis of tippe top motion*
Abstract: The tippe top is a small spinning toy which exhibit some curious features. When spun, it turns over and starts spinning on its handle. Despite its simple costruction, the dynamics of this "inversion" motion is not completely understood. In this talk I will present the model for the tippe top, provide an explanation for the inversion and talk about some of the tools we use to analyze the dynamics of tippe top.

15.45-16.05 Christine Jost, Stockholms universitet: *Från grad och genus till karakteristiska klasser*
Abstract: En slät algebraisk kurva kan beskrivas med dess grad och genus. Karakteristiska klasser är invarianter för algebraiska varietéer som bland annat generaliserar grad och genus till varietéer av högre dimension. Förutom att karakteristiska klasser bildar en central del av algebraisk geometri i allmänhet, används de mest inom enumerativ geometri. I och med datorteknikens enorma framsteg har beräkningsaspekten inom algebraisk geometri som för alla av matematikens områden blivit ett allt större forskningsområde, och nutidens matematiker kan i allt större grad få hjälp av datorexperiment i sin forskning. Grad och genus av kurvor är klassiska beräkningar som är implementerade i alla datoralgebrasystem specialiserade på kommutativ algebra och algebraisk geometri. Beräkning av karakteristiska klasser i allmänhet är däremot förhållandevis nytt. I detta föredrag kommer jag att ge en kort introduktion till karakteristiska klasser som generalisering av grad och genus för släta kurvor. Jag kommer även att ge en kort inblick i algoritmer som möjliggör att beräkna dessa invarianter på en dator.

16.15-16.35 Gabriel Bartolini, Linkping: *Strukturen av förgreningsmängder av modulirum av Riemannytor*
Abstract: Rummet av konformt ekvivalenta Riemannytor kallas för modulirummet. Detta rum är dock inte en mångfald, så vanligvis går man via övertäckningen av modulirummet givet av Teichmüllerrummet, som är en mångfald. Förgreningsmängden av denna övertäckning ges, för ytor av genus 2 eller större, av Riemannytor med icke-triviala automorfier. Med hjälp av denna identifiering kan vi studera strukturen av förgreningsmängden och därigenom modulirummet.

Lördag 19 november

9.30-9.50 Martin Křepela, Karlstad: *Almost-compact embeddings of function spaces*
Abstract: The study of embeddings of function spaces has an important role in the function theory and has many applications in the operators theory, PDE's and related topics. The problem of a compact embedding is of particular interest but usually very hard to deal with. In the talk we present an idea of another type of embedding which is weaker than the compact one. We show the basic properties of it and its application to the compact embedding problems. Furthemore, related results for the classical Lorentz spaces with general weights will be shown.

10.00-10.20 Bruno Benedetti, KTH: *Sharpness of Discrete Morse theory*
Abstract: The Fields medalist Steven Smale called Morse theory "the most important single contribution to mathematics by an American mathematician". The theory has been recently "discretized", i.e. adapted to surfaces and objects that are triangulated or pixelated, rather than smooth. The discrete version is much simpler, though surprisingly precise.

10.30-10.50 Kaffe

11.00-11.20 Ivan Martino, Stockholms universitet: *Evolutionary Optimization for Algebraic Varieties*
Abstract: This work presents a new evolutionary optimization algorithm in theoretical mathematics with important applications in scientific computing. The use of the evolutionary algorithm is justified by the difficulty of the study of the parametrization of an algebraic variety, an important problem in algebraic geometry. We illustrate an application, Evo-Runge-Kutta, in a problem of numerical analysis. Results show the design and the optimization of particular algebraic variety, the explicit s levels Runge-Kutta methods of order q. The mapping between algebraic geometry and evolutionary optimization is direct, and we expect that many open problems will be modelled in the same way.

11.30-11.50 Lukás Malý, Linköping: *Newtonian spaces based on Banach function lattices*
*Abstract:*Newtonian spaces provide a valuable tool for first-order analysis on metric spaces where the classical Sobolev spaces cannot be defined since taking partial derivatives is impossible. Newtonian spaces are spaces of functions of Sobolev type where weak derivatives are replaced by so-called upper gradients. Their properties have been intensively studied for various underlying function spaces, in particular, for L^p with $1 \leq p < \infty$ or Orlicz spaces. The aim of this talk is to introduce Newtonian spaces based on a considerably wider class, i.e., Banach function lattices, and investigate their fundamental properties in such a general setting, including completeness, absolute continuity of functions along curves, as well as uniqueness of upper gradients. We will also compare Sobolev and Newtonian spaces in the special case when the metric space has a linear structure.