Bay Area Differential Geometry Seminar

Saturday, May 2, 2015. 10 AM-5 PM

U. C. Santa Cruz , McHenry Library Building, Room 4130

Parking is plentiful and unrestricted on weekends. The closest lots are the Hahn Student Services lot or the Theater Lot.

• 10:00–11:00 **Reception, Morning Coffee** in the department's Tea Room: McHenry 4161.

• 11:00-12:00 **Richard Montgomery, UC Santa Cruz**: *Realizing all free homotopy classes in the planar three-body problem.*

• 12:00–2:00 **Lunch**

A cafe serves lunch on the main floor of the building we meet in. Scads of lunch places exist a ten minute drive away.

• *1:45–2:00 Organizational meeting to plan next BADGS*

• *2:00–3:00* **Richard WentWorth, University of Maryland***: Higgs bundles at the Fuchsian locus.*

• *3:00–4:00* **Afternoon Tea-Coffee**

• *4:00–5:00* **Bill Goldman, U of Maryland***: Moduli spaces of Geometric Structures.*

• *6:00* **Dinner** *(Please sign up using the link* **signup list***).*
Participants and their significant others are invited to a dinner to be arranged at a local restaurant on Saturday evening. The cost of the dinner will be reduced for students and postdocs. Details are on the signup page for the dinner (which you can access by the link above).

ABSTRACTS: • *11:00-12:00* **Richard Montgomery, UC Santa Cruz***: Realizing all free homotopy classes in the planar three-body problem.*

The configuration space of the planar three-body problem, reduced by rotations and with collisions excluded, has a rich topology which supports a large set of free homotopy classes. These classes have a simple description in terms of syzygy (or eclipse) sequences. Each homotopy class corresponds to a unique "reduced" syzygy sequence. We prove that each reduced syzygy sequence is realized by a periodic solution of the rotation-reduced Newtonian planar three-body problem. The key new idea was to give up on 17 years of trying to prove this result using variational methods and to and instead search for a dynamical mechanism. The heart of the mechanism was uncovered by Rick Moeckel in the 1980s using McGehee's blow-up method. This is joint work with Rick Moeckel of the U. of Minnesota.

• *2:00–3:00* **Richard WentWorth, University of Maryland***: Higgs bundles at the Fuchsian locus.*

For a closed Riemann surface X and complex reductive Lie group G, the moduli space of G-Higgs bundles on X is a hyperkaehler algebraic completely integrable system that plays an important role in moduli space theory, representations of surface groups, and supersymmetric gauge theories. The uniformization of X and the choice of a principal $SL2$ in G give rise to a distinguished point in the moduli space called the Fuchsian point. In this talk I will discuss the first order behavior of certain geometric and dynamical quantities at the Fuchsian point. These may be regarded as "higher" analogs of results in Teichmueller theory and for complex projective structures. This is joint work with Francois Labourie.

• *4:00–5:00* **Bill Goldman, U of Maryland***: Moduli spaces of Geometric Structures.*
Given a topology S, how many ways (if any) are there of putting some kind of classical geometry on S? For example, the sphere has no compatible system of coordinates with Euclidean geometry. (There is no metrically accurate atlas of the world.) On the other hand, the 2-torus admits a rich supply of Euclidean structures, which form an interesting moduli space which itself enjoys hyperbolic non-Euclidean geometry. For other geometric structures, the moduli spaces are much more complicated and are best described by a dynamical system. This talk will survey some of the interesting dynamical systems which arise for simple examples of geometries on surfaces.