GEAR
Summer 2014 REGS Projects

Project Supervisor	Project Location	Project Title	Project Description	Number of positions available	Dates
Jayadev Athreya and Vaibhav Gadre jathreya@illinois.edu	Warwick and Urbana	Gap Distributions for Veech Surfaces	The project is on the gap distribution of saddle connections on general lattice L-shaped polygons. The project will give us deeper insight into the nature of the flat geometry of these tables. Since I will be at Cambdrige for part of the summer, I am siting the project at Urbana + Warwick, where the student can benefit from interaction with Prof. Vaibhav Gadre (a co-mentor on the project), Prof. Caroline Series, Prof. John Smillie, Prof. Mark Pollicott, Prof. Brian Bowditch, and Prof. Richard Sharp during their time in Warwick. I also will be in Warwick for some time, and Cambridge as well, and even when I am off site I will be participating in regular Skype meetings. http://prezi.com/_i0-wivgf8a1/gap-distributions-and-homogeneous-dynamics/	1	June 15-Aug 15, 2014
Graeme Wilkin (graeme@nus.edu.sg)	National University of Singapore	Compactifications of moduli spaces of Higgs bundles	A recent paper by Taubes proves an Uhlenbeck compactness theorem for moduli spaces of flat PSL(2,C) connections over compact manifolds of dimension 2 or 3. The goal of this project is to explore possible generalisations of this result to moduli spaces of parabolic Higgs bundles.	1	July 26-Sept 20, 2014
Steve Bradlow (bradlow@illinois.edu)	Univ of Illinois at Urbana-Champaign	U(p,q)-Higgs bundles and holomorphic chains	One benefit of the correspondence between Higgs bundles and surface group representations is that it makes gauge theoretic methods available for studying representation varieties. In the case of representations into the real group U(p,q), the corresponding Higgs bundles are naturally related to more general objects known as quiver bundles. The quiver bundle setting admits greater flexibility than is evident in the Higgs bundles corresponding to the surface group representations into U(p,q), and is thus	1	May 5-23, 2014

			potentially more revealing. The goal of this project is to explore the gauge theoretic relations between the U(p,q)-Higgs bundles and the quiver bundles, with a view to better understanding the U(p,q)-representation varieties. In view of the short time available, this project is suitable only for a student with a good background in Higgs bundles.		
Martin Bridgeman (bridgem@bc.edu)	Boston College	Identities on Moduli Spaces	We propose to study identities on hyperbolic manifolds, in particular the identities of Basmajian, Bridgeman-Kahn, McShane-Mirzakhani and Luo-Tan. We will investigate relations between these identities and explore various open problems in the area. http://www2.bc.edu/~bridgem	1	June 16-July 31, 2014
Greg McShane (greg.mcshane@gmail.com)	Grenoble, France	Geometric identities for higher Teichmuller-Thurston Theory	We will explore techniques of generalizing geometric identities on moduli space to higher Teichmuller-Thurston theory and other representation varies.	1	June 18-July 25, 2014