

GEAR REGS PROJECTS SUMMER 2016

Project Supervisor	Project Title	Project Location	Project Dates	Project Description	# of Positions Available	More Information
Andrew Neitzke	Spectral Networks and the exact WKB method	University of Texas at Austin	April 18, 2016 to May 16, 2016	The student will study the relationship between the "abelianization" associated to the spectral networks coming from Higgs fields and the method of exact WKB.	1	neitzke@math.utexas.edu
Juan Souto jsoutoc@gmail.com	Hyperbolic 3-manifolds of infinite type	University of Rennes 1	May 1, 2016 to June 30, 2016	After the work of Thurston and Perelman, one understands very well which 3-manifolds of finite topological type admit a complete hyperbolic metric. The situation is different for those manifolds with infinite type, meaning for instance with infinitely generated fundamental group. The goal of this project would be to figure out (at least among some interesting class) which 3-manifolds are homeomorphic (or at least homotopy equivalent) to a hyperbolic 3-manifold. This question has many variants and leads to other problems. For instance, if correctly formulated, a very interesting problem is to determine whether the corresponding hyperbolic manifold unique or if admits non-trivial deformations.	1	jsoutoc@gmail.com
Jason Manning	simplicial volume and Dehn filling	Cornell University	June 20, 2016 to July 10, 2016	In a paper by K. Fujiwara and J. F. Manning ("Simplicial volume and fillings of hyperbolic manifolds") the question is posed whether, under Dehn filling, the simplicial volume of a hyperbolic n -manifold strictly decreases (Conjecture 1.8). A proof of the conjecture would extend for $n > 3$ a similar result by Thurston (see "The geometry and topology of Three-manifolds", Theorem 6.5.6). The goal of this project is to translate the conjecture into a question about bounded cohomology, and attempt to answer it, perhaps in some special cases, such as the CAT(0) homology 4-spheres of Ratcliffe and Tschanz.	1	jfmanning@math.cornell.edu
Jon Chaika	Central limit theorem of the Kontsevich-Zorich cocycle	University of Utah	July 1, 2016 to July 31, 2016	The current project concerns obtaining limit theorems. The focus is on the law of iterated logarithm and the central limit theorem for the Kontsevich-Zorich cocycle.	1	chaika@math.utah.edu
Tony Pantev	Integral transforms for meromorphic gerbes	University of Pennsylvania	July 18, 2016 to August 12, 2016	We plan to investigate Fourier-Mukai dualities on moduli of ramified Higgs bundles. We will focus on the cases when the moduli can be viewed as meromorphic gerbes and will study how the duality transforms the gerbe structures and its effect on the associated non-commutative Hodge structures.	1	tpantev@math.upenn.edu