

## GEAR Research Experience for Graduate Students (REGS) Projects Summer2017

Project Supervisor	Project Title	Project Location	Project Dates	Project Description	# of Positions Available	More Information
Juan Souto jsoutoc@gmail.com	Nielsen classes of minimal generating sets for the fundamental groups of certain knot complements	University of Rennes 1	May 1, 2017 to June 30, 2017	The goal would be to study minimal generating sets of certain types of hyperbolic knot complements. For example, a concrete goal would be to prove that the fundamental group of the complement of a tunnel number one knot with sufficiently large Heegaard distance has a unique Nielsen equivalence class of minimal generating sets. The student interested on working on this project should have some background on Kleinian groups, their deformations, and classical theorems on the area like Thurston's covering theorem, Canary's filling theorem, as well as the tameness theorem. Reading the paper "Ranks of mapping tori via the curve complex" by Biringer-Souto would also probably be useful.	1	jsoutoc@gmail.com
Michael Wolf	Sp(4,R) Planar Higgs bundles with wild ramification	Rice University	June 5, 2017 to July 30, 2017	We study the solution of Hitchin's equations for Higgs fields on the sphere which have finite order poles at infinity. We aim for a classification that reflects the geometry of the relevant (quadratic and) quartic differentials.	1	mwolf@rice.edu
Hugo Parlier	The geometry of multi-arc graphs	University of Luxembourg	August 8, 2017 to September 9, 2017	Arc and curve type graphs for surfaces continue to play an important role in the study of Teichmüller spaces and mapping class groups. The project aims to study convexity problems and the hyperbolicity of certain relatives of arc and curve graphs where, for instance, vertices are multi-arcs and edges come from disjointness or minimal intersection.	1	<a href="http://math.uni.lu/parlier/">http://math.uni.lu/parlier/</a>
Christopher J Leininger	Embeddings between Hierarchically Hyperbolic Spaces	University of Illinois at Urbana-Champaign	July 15, 2017 to August 25, 2017	Hierarchically Hyperbolic Space structure were defined and developed by Behrstock-Hagen-Sisto, motivated by common themes in the study of CAT(0) spaces and mapping class groups of surfaces, specifically those uncovered in the seminal work of Masur and Minsky. One of my current students, Sarah Mousely, has been studying the asymptotic geometry of various HHS structures as it relates to work of mine with Clay and Mangahas which mixed geometric aspects of CAT(0) geometry and the geometry of the mapping class group. The goal of this project is to explore generalizations of the entire class of HHS spaces.	1	clein@illinois.edu