REU Seminar Series

Thursday, 1:00pm, Nesbitt Room **August 2**

Oliver Pechenik, Faculty

Title: ***How to give bad math talks***

Abstract: We'll discuss various ways to annoy your audience and generally be an ineffectual speaker.

William Warner

(Mentor: Thomas Bothner)

Title: ***The Scaling Function Connection Problem in the Two-Dimensional Ising Model***

Abstract: The Ising model, introduced by physicists Wilhelm Lenz and Ernst Ising in 1920, is a mathematical model of ferromagnetism. States of the two-dimensional Ising model consist of random, interacting spins representing magnetic dipoles at each grid point on a rectangular lattice. This model is notable for being one of the simplest statistical mechanics models that exhibit a phase transition, mimicking the physical phenomenon of spontaneous magnetization. The Ising model is also significant in how it incorporates rich mathematics in the form of Painlev´e equations and asymptotic connection theory into the realm of physics. In this talk I will outline a brief history of the Ising model and its breakthroughs and highlight its mathematical significance. Finally, I will present our results on a generalized connection problem for the spin-spin correlation functions in the two-dimensional model.

Felipe Castellano-Macias

(Mentor: Felix Janda)

Title: ***Gauged linear sigma model spaces***

Abstract: The gauged linear sigma model (GLSM) originated in physics but it has recently made it into mathematics as an enumerative theory of critical loci. We will talk about the geometry of the input data of the GLSM, here referred to as GLSM space. One of the ingredients of a GLSM space is a complex manifold. We will show that one-dimensional nontrivial GLSM spaces are toric varieties, which allows us to classify all one-dimensional GLSM spaces. We will also explore other examples of GLSM spaces.

Wyatt Reeves and Nikolay Grantcharov

(Mentor: Tasho Kaletha)

Title: ***Galois representations valued in reductive groups and their centralizers***

Abstract: A central topic in algebraic number theory is to study representations of the absolute Galois group $\text{Gal}(\bar{\Q}/\Q)$ valued in a complex, reductive Lie group, G. We are interested in a particular problem stemming from this: describe representations of $\text{Gal}(\bar{\Q_p},\Q_p)$ modulo its wild inertia such that the image of this quotient in G has finite centralizer. For each such centralizer, we also describe its representations.