Geometry, Statistical Mechanics, and Integrability

## March 11 - June 14, 2024

Scientific Overview

In the last 20-30 years probability theory and statistical mechanics have been revitalized with the introduction of tools from geometry, notably conformal geometry and discrete analyticity, but also algebraic geometry and integrable systems. Recent connections between classical and discrete geometric structures on surfaces, and combinatorial models reveal a significant connection with geometry, notably hyperbolic geometry and polyhedra.

There are well-known connections between some statistical mechanics models and representation theory, such as Young diagrams, Gelfand-Tsetlin patterns, Knutson-Tao puzzles and Littlewood-Richardson coefficients and their generalizations. The Bethe Ansatz and the Yang-Baxter equation were developed for the 6-vertex model but are now fundamental tools in combinatorial representation theory.

This program will bring together researchers in this somewhat disparate realm of ideas, united by the underlying themes of geometry and statistical mechanics.

Long Program Schedule

- Opening Day: March 11, 2024
- Geometry, Statistical Mechanics, and Integrability Tutorials: March 12-15, 2024
- Workshop I: Statistical Mechanics and Discrete Geometry: March 25-29, 2024
- Workshop II: Integrability and Algebraic Combinatorics: April 15-19, 2024
- Workshop III: Statistical Mechanics Beyond 2D: May 6-10, 2024
- Workshop IV: Vertex Models: Algebraic and Probabilistic Aspects of Universality: May 20-24, 2024
- Culminating Workshop at Lake Arrowhead: June 9-14, 2024
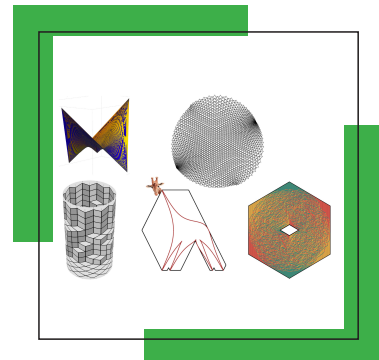
Organizers

Dmitry Chelkak (Uni of Michigan)
Jan de Gier (Univ. Melbourne)
Vadim Gorin (UC Berkeley)
Richard Kenyon (Yale)
Greta Panova (USC)
Sanjay Ramassamy (CNRS)
Marianna Russkikh (Caltech)

Participation

This long program will involve senior and junior researchers from several communities relevant to this program. You may apply for financial support to participate in the entire fourteen-week program, or a portion of it. We prefer participants who stay for the entire program. Applications will be accepted through **October 11, 2023**, but offers may be made up to one year before the start date. We urge you to apply early. Mathematicians and scientists at all levels who are interested in this area of research are encouraged to apply for funding. Supporting the careers of women and minority researchers is an important component of IPAM's mission and we welcome their applications. More information and an application is available online.

For more information, visit the program webpage:
www.ipam.ucla.edu/gsi2024