Nikolay Grantcharov

• nikolayg@uchicago.edu •US Citizen

EDUCATION

University of Chicago

- Ph.D. in Mathematics — Sep 2019-

University of California, Berkeley

- B.A. in Mathematics — Aug 2015 – May 2019
  - Graduated with highest honors

ACADEMIC AWARDS

- NSF Graduate Research Fellowship $\$102,000$ — 2020 – 2023
- Dorothea Klumpke Roberts Prize in Mathematics — May 2019
  UC Berkeley department prize awarded to seniors who have demonstrated truly exceptional scholarship in mathematics
- UC Berkeley Regents' and Chancellor's Scholarship, $\$10,000$ — 2015 – 2019
  Awarded to 200 undergraduates each year, most prestigious scholarship offered by UC Berkeley.
- Esterline Scholarship, $\$6,000$ — 2015 – 2019
  Awarded to 10 students who are children of Esterline employees.
- UC Berkeley Dean's Honors List — Aug 2015– May 2017
  Top 4% of UC Berkeley College of Letters and Science Undergraduates.

RESEARCH EXPERIENCE

My research interests lie in representation theory of Cherednik algebras, algebraic groups, and Lie algebras. Currently I am thinking about Cherednik algebras in positive characteristic.

Extension Quiver for Lie Superalgebra q(3) — May 2017–May 2019

- *SIGMA*, **16** (2020), 141, 32 pages https://www.emis.de/journals/SIGMA/2020/141/
- Together with V. Serganova, we used standard representation theoretic techniques such as highest weight theory, induction and restriction functors, and Bott-Borel-Weil theory to compute the cohomological Ext^1 group between all finite-dimensional simple $\mathfrak{q}(3)$-supermodules.

Support Varieties for Simple Classical Lie superalgebras — May 2017–Oct 2018

- *Advances in Mathematics*, **381** (April 2021), 107647, 44 pages https://arxiv.org/pdf/1810.06980v3.pdf
- With collaborators D. Nakano, D. Grantcharov, and J. Wu, we introduced a class of parabolic superalgebras which allowed us to prove a support variety conjecture for all simple classical Lie superalgebras $\mathfrak{g} = \mathrm{Lie}(G)$. As a byproduct, we computed the higher sheaf cohomology $R^j \mathrm{ind}_P^G \mathbf{C}$ using data from the Bott-Borel-Weil theorem.

Galois Representations valued in Reductive Groups and their Centralizers — Jun 2018–Aug 2018

- Preprint available at UMich REU website.
- With Michigan REU advisor T. Kaletha and student W. Reeves, we classified certain Galois representations - depth-zero supercuspidal Langlands parameters - which arise from the local Langlands correspondence. This was accomplished by studying the root system and Weyl group of a complex reductive group and group cohomology.

TEACHING

University of Chicago College Fellow — Sep 2020 – Jun 2021

- Spring 2021: Math 259 Honors Basic Algebra III, taught by F. Calegari.
- Winter 2021: Math 244 Introduction to Algebraic Geometry, taught by S. Filip.
- Fall 2020: Math 254 Basic Algebra I, taught by P. Tosteson.

AwesomeMath Summer Program Instructor — Jun 2017 – Today

- AwesomeMath is a 3 week long summer program for gifted high school students training for math olympiads such as USAMO and IMO.
- Taught and prepared course material daily for Geometry 2.5 (intermediate) in multiple camps during Summers of 2017 - 2020 and Geometry 3 (advanced) Summer 2021.
- Developed course curriculum and wrote course notes for new Geometry course (2021)

WORK EXPERIENCE

UChicago REU Mentor Jun 2020 – Aug 2020
- Helped run the apprentice program and mentored J.Yang on project "Super five of Ramsey Theory" and G. Graham "The ring of symmetric polynomials"

AwesomeMath Summer Program Teaching Assistant Jun 2014 – Aug 2016
- In charge of problem sessions, held office hours, and graded exams for two courses per camp.
- Throughout 7 camps, I was a TA for: Algebra 2.5, 3.5; Geometry 1.5, 2.5; Number Theory 2.5.

Berkeley Math Circle Assistant Jul 2015 – Jul 2016
- Managed BMC Website (http://mathcircle.berkeley.edu).
- Handled email communication with BMC instructors, parents and students.
- Helped with selection process for 400 applicants.

Berkeley Math Homework Grader Jan 2017 – May 2019
- Grade weekly homework assignments for Abstract Algebra (113) for 40 students in the following terms: Spring 2017, Summer 2017, Fall 2017, Spring 2018, Spring 2019.
- Grade for graduate level Commutative Algebra (250B) Spring 2019 term.

INVITED TALKS
- Columbia University student seminar on category $\mathcal{O}$ (online), "Projective Functors" (90 mins), April 2, 2021.
- Columbia University student seminar on category $\mathcal{O}$ (online), "Parabolic Category $\mathcal{O}$" (90 mins), February 12, 2021.
- Superalgebra Theory and Representations seminar (online), Weizmann institute, "Finite-dimensional representation theory of the queer Lie superalgebra q(n)" (75 mins), December 2, 2020.
- Columbia University student seminar on category $\mathcal{O}$ (online), "Translation functors for BGG category O" (90 mins), September 18, 2020, Notes.
- Representation Theory and Integrable Systems conference, Zurich, Switzerland, "Extension quiver for Lie superalgebra q(3)" (15 mins), August 14, 2019, Slides.
- Global Langlands over function fields seminar, U. C. Berkeley, April 4, 2019. Title "Excursion operators" (90 mins).
- Math Monday undergraduate seminar, U. C. Berkeley, April 22, 2019. Title "Symmetric Polynomials and Representation Theory" (60 mins).

CONFERENCES ATTENDED
- Springfest in honor of Vera Serganova, online, April 26-May 6, 2021.
- Graduate Summer school on geometry and modular representation theory of algebraic groups, Stony Brook, NY, August 19-23, 2019.
- Representation Theory and Integrable Systems, Zurich, Switzerland, August 12-16, 2019.
- Representation Stability Workshop, U. Michigan, Ann Arbor, August 13-17, 2018.
- Representation Theory Day in Québec City, July 29, 2017.
- Congress of the Americas in Montreal, Canada July 24-28, 2017. Attended special sessions in Representations of Lie Algebras and Group Cohomology.

SERVICE
- Reviewer for AMS Mathematical Reviews, 2021 – today.

LANGUAGES English (Fluent), Bulgarian (Fluent), Spanish (Intermediate), French (Technical Reading).

SKILLS Python, HTML, Scheme, LaTeX, Java.

INTERESTS Tennis (7 years, competitive), Basketball, Hiking and Traveling.

REFERENCES Available upon request.

CV compiled on 2021-05-31