Algebraic Combinatorics Learning Seminar
Fall 2026

Information

The algebraic combinatorics learning seminar will meet this year on

Wednesdays, 2:30pm-3:30pm, EH4088

starting on September 16th. The semester's theme is

Solvable lattice models in combinatorics

The main references are

[1] Allen Knutson and Paul Zinn-Justin, [arXiv:1706.10019]
Schubert puzzles and integrability I: invariant trilinear forms.

[2] Allen Knutson and Paul Zinn-Justin, [arXiv:2102.00563]
Schubert puzzles and integrability II: multiplying motivic Segre classes.

[3] Allen Knutson and Paul Zinn-Justin, [arXiv:2306.13855]
Schubert puzzles and integrability III: separated descents.

[4] Paul Zinn-Justin, [arXiv:0901.0665]
Six-Vertex, Loop and Tiling models: Integrability and Combinatorics.

[5] Paul Zinn-Justin, [arXiv:2404.13221]
Integrability and combinatorics.

See this page for more information:

`https://gtbarkley.org/seminars/latticemodels26/`

Initial Talk Schedule

We will begin with an introduction to solvable lattice models following [4], then transition into their connection to Schubert calculus following [1, 2, 3].

- Week 1 (Sep 16) — Rui gives introduction.
- Week 2 (Sep 23) — Fock Space. Cover 1.1 (Free fermions) and parts of 1.2 (Schur functions). Definitely 1.2.1 and possibly 1.2.2, 1.2.3.
- Week 3 (Sep 30) — Plane partitions. Cover 1.3 (Plane partitions) and parts of 1.2 (maybe 1.2.5, 1.2.6, 1.2.8)
- Week 4 (Oct 7) — Six-vertex model I. Cover 2.1, 2.2, and 2.3.
- Week 5 (Oct 14) — Six-vertex model II. Cover 2.4, and parts of 2.5. Can add material from [5].
- Week 6 (Oct 21) — Loop models. Cover 3.1, 3.2.1, 3.2.2, 3.2.3
- Week 7 (Oct 28) — Temperley–Lieb algebra. Cover 3.2.5 and 3.3.

Further directions

Besides Schubert calculus, we may also explore relevant background in representation theory:

- Pavel Etingof, Mykola Semenyakin, [arXiv:2106.05252]
  A brief introduction to quantum groups
- Victor Ginzburg, [arXiv:0905.0686]
  Lectures on Nakajima's Quiver Varieties
- David Hernandez, [arXiv:1704.06039]
  Advances in R-matrices and their applications (after Maulik–Okounkov, Kang–Kashiwara–Kim–Oh,...)
- Ben Brubaker, Daniel Bump, Solomon Friedberg, [arXiv:0912.0911]
  Schur Polynomials and the Yang–Baxter equation