

# Edward L. Richmond

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Oklahoma State University  
Department of Mathematics  
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## Education:

- University of North Carolina - Chapel Hill, NC  
Ph.D, Mathematics (May 2008)  
Advisor: Prakash Belkale  
Thesis title: Recursive structures in the cohomology of flag varieties
  - Colgate University - Hamilton, NY  
BA, Mathematics, with honors (May 2000)
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## Research Interests:

I am interested in algebraic combinatorics, algebraic geometry, representation theory and Lie theory. In particular, I work with geometric and algebraic aspects of Schubert varieties, flag varieties, Coxeter groups and related topics.

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## Appointments:

- Assistant Professor, Oklahoma State University, Stillwater, OK (Fall 2013-present)  
(on leave 2013-2014 academic year)
  - Graduate Director of Mathematics, Oklahoma State University, Stillwater, OK (Fall 2018-present)
  - Learning and Teaching Fellow, University of British Columbia - Vancouver, BC (Fall 2013 - Spring 2014)
  - Visiting postdoctoral researcher, ICERM - Providence, RI (Spring 2013)
  - Postdoctoral Fellow, University of British Columbia - Vancouver, BC (Fall 2010 - Spring 2013)
  - Visiting Assistant Professor, University of Oregon - Eugene, OR (Fall 2008 - Spring 2010)
  - Teaching Fellow, UNC - Chapel Hill, NC (Fall 2002 - Spring 2008)
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## Grants and Awards:

- Collaborate@ICERM workshop “The geometry of Nash blowups of Schubert varieties, fiber products of resolutions, and Peterson translation” (Summer 2019). CoPIs: Dave Anderson (Ohio State), Laura Escobar (Wash U. in St. Louis), William Slofstra (Waterloo), Alex Woo (Idaho). Amount: Travel support for each PI.
- Collaborate@ICERM workshop “Hyperplane arrangements, Peterson translation and the Nash blowup of a Schubert variety” (Summer 2017). CoPIs: Jim Carrell (UBC), William Slofstra (Waterloo), Alex Woo (Idaho). Amount: \$1,359.36 for each PI.
- Koslow Research Experience Faculty Mentor Award (Student: Tim Alland) (2017): Amount: \$1,000.

- NSA Young Investigators grant “Combinatorics and geometry of Schubert varieties” (2016-2017). Amount: \$40,000.
  - OSU Deans Incentive Grant (2015, 2016). Amount: \$3,000 each year.
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### Refereed Publications:

1. *Smooth Schubert varieties in the affine flag variety of type A.*  
with W. Slofstra, *European J. of Combin.* vol 71 (2018), 125-138.
2. *Pattern avoidance and fiber bundle structures on Schubert varieties.*  
with T. Alland, *J. Comb. Th. Series A.* vol 154 (2018), 533-550.
3. *Staircase diagrams and the enumeration of smooth Schubert varieties.*  
with W. Slofstra, *J. Comb. Th. Series A.* vol 150 (2017), 328-376.
4. *Billey-Postnikov decompositions and the fibre bundle structure of Schubert varieties.*  
with W. Slofstra, *Math. Ann.* vol 366 (2016), 1-2, 31-55.
5. *Littlewood-Richardson coefficients for reflection groups.*  
with A. Berenstein, *Advances in Math.* vol 284 (2015), 22, 54-111.
6. *A combinatorial characterization of tight fusion frames.*  
with M. Bownik and K. Luoto, *Pacific J. Math.* vol 275 (2015), no. 2, 257294.
7. *Rationally smooth elements of Coxeter groups and triangle group avoidance.*  
with W. Slofstra, *J. Algebraic Combin.* 30 (2014), no. 39, 659-681.
8. *Eigenvalues of hermitian matrices and equivariant cohomology of Grassmannians.*  
with D. Anderson and A. Yong, *Compositio Math.* vol 149 (2013), 1569-1582.
9. *The Belkale-Kumar cup product and relative Lie algebra cohomology. (Appendix)*  
with S. Evens. and W. Graham, *Int. Math. Res. Not.* 2013 (2013), 1901-1933.
10. *A multiplicative formula for structure constants in the cohomology of flag varieties.*  
*Michigan Math. J.* 61 (2012), no. 1, 3-17.
11. *Branching Schubert calculus and the Belkale-Kumar product on cohomology.*  
with N. Ressayre, *Proc. Amer. Math. Soc.* 139 (2011), no. 3, 835-848.
12. *A partial Horn recursion in the cohomology of flag varieties.*  
*J. Algebraic Combin.* 30 (2009), 1-17.

### Preprints:

13. *The Nash blow-up of a cominuscule Schubert variety*  
with W. Slofstra and A. Woo, submitted.

### Conference Proceedings:

14. *Pattern avoidance and fiber bundle structures on Schubert varieties.*  
with T. Alland, Proceedings of the 29th annual Conference on FPSAC (2017).  
(this is an alternate version of the paper above of the same name).
15. *A noncommutative geometric LR rule.*  
with V. Tewari and S van Willigenburg, Proceedings of the 28th annual Conference on FPSAC (2016).

16. *Staircase diagrams and the enumeration of smooth Schubert varieties.*  
with W. Slofstra, Proceedings of the 28th annual Conference on FPSAC (2016).  
(this is an alternate version of the paper above of the same name).
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**Teaching Experience at the Oklahoma State University:**

- Topics in Algebraic Combinatorics (Math 5010) - Fall 2017
  - Research Methods (Math 3933) - Spring 2016, 2017, 2018
  - Intro to Modern Algebra (Math 3613) - Fall 2015, Fall 2018
  - Linear Algebra (Math 3013) - Fall 2015, Fall 2017, Spring 2015, 2018
  - Calculus II (Math 2153) - Fall 2014, 2016, 2018, Spring 2017
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**Advising:**

1. Ph.D. student advisor for S.M. Faqruddin Azam.
  2. Master's student advisor for Ajeeth Gunna Reedy, expected graduation 2019.
  3. Undergraduate advisor for Tim Alland, graduated 2017 (currently in math grad school at SUNY Stony Brook)
  4. Master's committee member for Nina Williams.
  5. Ph.D. committee member for Scott Larson, Rose Uscanga and Nina Williams.
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**Research Talks (since 2014):**

- Algebra seminar, Virginia Tech - Blacksburg, VA, December 2018.
- Algebra seminar, University of Oklahoma - Norman, OK, October 2018.
- Combinatorics seminar, University of Washington - Seattle, WA, April 2018.
- Graduate seminar, Oklahoma State University - Stillwater, OK, March 2018
- Lie Theory seminar, Oklahoma State University - Stillwater, OK, January 2018.
- Geometry, combinatorics and Integrable systems seminar, Ohio State University - Columbus, OH, September 2017.
- Algebra and combinatorics seminar, Oklahoma State University - Stillwater, OK, September 2017.
- AMS Central Sectional Meeting, University of North Texas - Denton, TX, September 2017.
- 2017 Formal Power Series and Algebraic Combinatorics Conference - London, UK, July 2017.
- Algebra and combinatorics seminar, Oklahoma State University - Stillwater, OK, February 2017.
- 2016 Formal Power Series and Algebraic Combinatorics Conference - Vancouver, BC, July 2016.
- AMS Western Sectional Meeting, University of Utah - Salt Lake, UT, April 2016.
- Lie Theory seminar, Oklahoma State University - Stillwater, OK, May 2015.
- Combinatorics seminar - University of Illinois - Urbana, IL, April 2015.
- Southwest Local Algebra Meeting - Oklahoma State University - Stillwater, OK, March 2015.

- Number Theory seminar, Oklahoma State University - Stillwater, OK, January 2015.
- AMS-MAA Joint Meetings 2015 - San Antonio, TX, January 2015.
- Representation theory seminar, University of Oklahoma - Norman, OK, December 2014.
- AMS Southeastern Sectional Meeting, UNC - Greensboro - Greensboro, NC, November 2014.
- Lie Theory seminar, Oklahoma State University - Stillwater, OK, October 2014.
- Colloquium, Oklahoma State University - Stillwater, OK, September 2014.
- 20th Coast Combinatorics Conference, University of Victoria - Victoria, BC, March 2014.
- Algebraic Geometry Seminar, UBC - Vancouver, BC, January 2014.
- AMS-MAA Joint Meetings 2014 - Baltimore, MD, January 2014.

**Non-Research Talks:**

- OSU High School Math contest speaker - Stillwater, OK, October 2018.
- Stillwater High School math club - Stillwater, OK, February 2018.
- Stillwater High School math club - Stillwater, OK, April 2017.
- OSU math club - Stillwater, OK, October 2015.
- Stillwater High School math club - Stillwater, OK, September 2015.

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**Academic Service (since 2012):**

- Referee for Communications in Algebra, Electronic Journal of Combinatorics, Indagationes Mathematicae, Journal of Algebra, Journal of Algebraic Combinatorics, and Transformation Groups. Also reviewer for Math Reviews.
- Co-organizer for a panel discussion on The Experiences of Foreign Graduate Students as GTAs at the AMS-MAA Joint meetings in San Diego, CA, January 12, 2018.
- Co-organizer of the OK-LSAMP Bridge to the Doctorate summer workshop, May 2017, 2018.
- Co-instructor for the OK-LSAMP online course 2017-2018.
- Co-organizer for a special session on Flag varieties at the AMS Central Section meeting in Denton, TX, September 9-10, 2017.
- Co-organizer for a special session in Algebraic Combinatorics at the AMS Western Section meeting in Salt Lake, UT, April 9-10, 2016.
- AMS-MAA Joint Committee on Teaching Assistants and Part-Time Instructors - 2016-2019.
- Master of Ceremonies for the team competition at OSU Math Day for high school students, October 2015, 2016, 2017.
- Graduate committee (chair) - 2018-2019.
- Personnel committee, OSU - 2017-2018.
- Putnam committee, OSU Fall 2015, 2017.
- Undergraduate committee, OSU - 2015-2016.

- Appointments committee, OSU - 2014-2015.
  - Assistant course designer for Math 104, Business Calculus at UBC - 2013-2014.
  - Organizer of the Algebraic Geometry Seminar at UBC, 2010-2013.
  - Volunteer representing UBC mathematics at an Opportunity Fair for high school students, Lord Byng Secondary School, November 15, 2012.
  - Volunteer for Math Mania for elementary school students at UBC, June 8, 2011 and July 19, 2012.
  - Master of Ceremonies at ELMACON 2012 (math contest for elementary school students) at UBC, May 5, 2012.
  - Volunteer for a Math Workshop for high school students in Richmond, BC, February 2, 2012.
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