

MANOJ KUMMINI
Curriculum Vitæ

Chennai Mathematical Institute
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Education

- Ph. D., University of Kansas, Lawrence, KS. Advisor: C. Huneke. Aug 2008. Dissertation: *Homological Invariants of Monomial and Binomial Ideals*.
- M. A. (Mathematics), University of Kansas, Lawrence, KS. Aug 2005.
- M. E. (Telecommunication Engineering), Indian Institute of Science, Bangalore, India. Jan 2002.
- B. Tech. (Electronics and Communication Engineering), University of Calicut, India. Mar 1999.

Employment

- Associate Professor, Chennai Mathematical Institute. Jul 2014 —
- Post-doctoral Fellow, Mathematical Sciences Research Institute, Berkeley, CA, USA. Aug – Dec 2012.
- Assistant Professor, Chennai Mathematical Institute. Jun 2011 — Jun 2014.
- Research Assistant Professor, Purdue University, West Lafayette, IN, USA. Aug 2008 — May 2011.
- Graduate Teaching Assistant, University of Kansas, Lawrence, KS, USA. Aug 2003 – Aug 2008.
- Texas Instruments India, Bangalore, Karnataka, India. Senior Design Engineer, Jan – Jul 2003. Design Engineer, Feb 2002 – Jan 2003.
- Sasken Communication Technologies, Bangalore, Karnataka, India. Software Engineer, Apr 1999 – Jul 2000.

Publications

(Available at http://arxiv.org/a/kummini_m_1)

- [1] M. Koley and M. Kummini, *F-rationality of Rees algebras*, 2017. submitted.
- [2] G. Caviglia, H. T. Ha, J. Herzog, M. Kummini, N. Terai, and N. V. Trung, *Depth and regularity modulo a principal ideal*, 2017. arXiv:1706.09675 [math.AC].
- [3] M. Kummini and S. K. Masuti, *On conjectures of Itoh and of Lipman on the cohomology of normalized blow-ups*, 2015. arXiv:1507.03343 [math.AC].
- [4] M. Kummini, V. Lakshmibai, P. Sastry, and C. Seshadri, *Free resolutions of some Schubert singularities*, Pacific J. Math. **279** (2015), no. 1-2, 299–328. arXiv:1504.04415v1 [math.AG]. MR3437780
- [5] M. Kummini and S. V Sam, *The cone of Betti tables over a rational normal curve*, Commutative algebra and noncommutative algebraic geometry, 2013. arXiv:1301.7005 [math.AC].
- [6] G. Caviglia and M. Kummini, *Betti tables of p -Borel-fixed ideals*, J. Algebraic Combin. **39** (2014), no. 3, 711–718. arXiv:1212.2201 [math.AC]. MR3183489
- [7] S. El Khoury, M. Kummini, and H. Srinivasan, *Bounds for the multiplicity of Gorenstein algebras*, Proc. Amer. Math. Soc. **143** (2015), no. 1, 121–128. arXiv:1211.1316 [math.AC]. MR3272737
- [8] C. Berkesch, D. Erman, and M. Kummini, *Three flavors of extremal Betti tables*, Commutative algebra, 2013, pp. 99–121. arXiv:1207.5707 [math.AC]. MR3051372
- [9] G. Caviglia and M. Kummini, *Poset embeddings of Hilbert functions and Betti numbers*, J. Algebra **410** (2014), 244–257. arXiv:1210.5562 [math.AC]. MR3201052
- [10] C. Berkesch, D. Erman, M. Kummini, and S. V Sam, *Shapes of free resolutions over a local ring*, Math. Ann. **354** (2012), no. 3, 939–954. arXiv:1105.2244 [math.AC]. MR2983074
- [11] C. Berkesch, D. Erman, M. Kummini, and S. Sam, *Tensor complexes: multilinear free resolutions constructed from higher tensors*, J. Eur. Math. Soc. (JEMS) **15** (2013), no. 6, 2257–2295. arXiv:1011.4604 [math.AC]. MR3120743
- [12] ———, *Poset structures in Boij-Söderberg theory*, Int. Math. Res. Not. IMRN **22** (2012), 5132–5160. arXiv:1010.2663 [math.AC]. MR2997051
- [13] K. Dalili and M. Kummini, *Dependence of Betti Numbers on Characteristic*, Comm. Algebra **42** (2014), no. 2, 563–570. arXiv:1009.4243 [math.AC]. MR3169588

- [14] G. Caviglia and M. Kummini, *Poset embeddings of Hilbert functions*, Math. Z. **274** (2013), no. 3-4, 805–819. arXiv:1009.4488 [math.AC]. MR3078248
- [15] M. Kummini and S. Murai, *Regularity of canonical and deficiency modules for monomial ideals*, Pacific J. Math. **249** (2011), no. 2, 377–383. arXiv:1006.1444 [math.AC]. MR2782675
- [16] M. Basavaraju, L. S. Chandran, and M. Kummini, *d -regular graphs of acyclic chromatic index at least $d + 2$* , J. Graph Theory **63** (2010), no. 3, 226–230. arXiv:0804.4681 [math.CO]. MR2590206
- [17] M. Kummini, *Regularity, depth and arithmetic rank of bipartite edge ideals*, J. Algebraic Combin. **30** (2009), no. 4, 429–445. arXiv:0902.0437 [math.AC]. MR2563135
- [18] G. Caviglia and M. Kummini, *Some ideals with large projective dimension*, Proc. Amer. Math. Soc. **136** (2008), no. 2, 505–509 (electronic). arXiv:math/0604436 [math.AC]. MR2358490
- [19] M. Kummini, *Alexander duality and Serre’s property (S_i) for square-free monomial ideals*, 2007. preprint.
- [20] ———, *Multiplicity bounds for quadratic monomial ideals*, 2007. arXiv:0707.1311v2 [math.AC].
- [21] M. Kummini and G. Thiagarajan, *The effect of sampling jitter in OFDM systems*, Proc. IEEE Intern. Conf. Commun., 2003, pp. 2061–2065.
- [22] M. Kummini and B. S. Rajan, *Full Rank Distance Codes and Optimal STBC for BPSK Modulation*, Proc. IEEE Intern. symp. on Inform. Theory, 2002, pp. 276.

Research Talks

- *Boij-Söderberg theory*, IIT Gandhinagar, Gujarat. April 2018.
- *Solving polynomial equations*, Colloquium, IISER Pune, Maharashtra. April 2018.
- *Castelnuovo-Mumford regularity*, Seminar, IIT Madras, Chennai, Tamilnadu. April 2018.
- *Solving polynomial equations*, Colloquium, Ramanujan Institute of Advanced Study in Mathematics, Madras University, Chennai, Tamilnadu. March 2018
- *F-rationality of Rees algebras*, Algebraic Geometry Seminar, Purdue University, West Lafayette, USA. March 2018
- *Singularities of conormal varieties*, Commutative Algebra Seminar, Purdue University, West Lafayette, USA. March 2018
- *F-rationality of Rees algebras*, Algebraic Geometry and Number Theory conference, Indian Statistical Institute, Bengaluru, Karnataka. Deceber 2017
- *F-rationality of Rees algebras*, National Conference on Commutative Algebra and Algebraic Geometry CAAG-2017, IISER Pune, Maharashtra. December 2017.
- *On the cohomology of normalized blow-ups*, University of Michigan, Ann Arbor, USA, July 2016.
- *Cohomology of normalized blow-ups*, Northeastern University, Boston, MA, USA. June 2016
- *On the cohomology of normalized blow-ups*, Indo-French Mathematics Meeting, Institute of Mathematical Sciences, Chennai, Tamilnadu. January 2016.
- *Generic initial ideals and their resolutions*, Tribhuvan University, Kathmandu, Nepal. April 2015.
- *A geometric technique of constructing interesting complexes*, Colloquium, Indian Statistical Institute, Bangalore, Karnataka. February 2015.
- *Free resolutions of some determinantal-line varieties*, CAAG 2015 Conference, IIT-Guwahati, Guwahati, Assam. February 2015.
- *Betti tables of p -Borel-fixed ideals*, Indian Statistical Institute, Kolkata, West Bengal. February 2015.
- *Betti tables of p -Borel-fixed ideals*, International Conference on Algebra and its Applications, Aligarh Muslim University, Aligarh, Uttar Pradesh. December 2014.
- *Free resolutions of some determinantal-line varieties*, University of Nebraska, Lincoln, NE. April 2014.
- *The cone of Betti tables over a rational normal curve*, Vietnam Institute for Advanced Study in Mathematics, Hanoi, Vietnam. December 2013.
- *From linear algebra to robotic arm design via Groebner bases*, Institute of Mathematical Sciences, Chennai. July 2013.
- *Hyperplane restriction theorems*, University of California, Berkeley, CA. November 2012
- *Poset embeddings of Hilbert functions*, City University of New York, New York, NY. October 2012.
- *Local Boij-Söderberg theory*, Northeastern University, Boston, MA. October 2012.
- *Hilbert functions and Betti numbers*, University of Missouri, Columbia, MO. September 2012.
- *Multilinear free resolutions from higher tensors*, Washington University, St. Louis, MO. September 2012.

- *Boij-Söderberg theory*, CAAG 2012 Conference, Pondicherry University, Puducheri. March 2012.
- *Vector bundles on projective spaces and modules over polynomial rings*, Colloquium, Indian Institute of Technology, Mumbai, Maharashtra. November 2011.
- *Boij-Söderberg Theory*, Indian Institute of Technology, Mumbai, Maharashtra. November 2011.
- *From linear algebra to robotic arm design: an expository talk on Gröbner bases*, Engineering College, Sreekrishnapuram, Kerala. September 2011.
- *Multilinear free resolutions from higher tensors*, AMS Spring Central Section meeting, Iowa City, IA. March 2011.
- *Multilinear free resolutions from higher tensors*, University of Illinois, Urbana, IL. March 2011.
- *On a conjecture of Lyubeznik on etale cohomological dimension*, University of Nebraska, Lincoln, NE. January 2011.
- *Bounds for arithmetic rank*, Joint Mathematics Meetings, New Orleans, LA. January 2011.
- *Poset structures in Boij-Söderberg theory: II - Supernatural sheaves*, AMS Fall Central Section meeting, South Bend, IN. November 2010.
- *Dependence of Betti numbers on characteristic*, University of Kentucky, Lexington, KY. October 2010.
- *Bounds for arithmetic rank of monomial ideals*, University of Notre Dame, South Bend, IN. October 2010.
- *Poset structures in Boij-Söderberg theory and homomorphisms of Cohen-Macaulay modules*, University of Missouri, Columbia, MO. September 2010.
- *Degree sequences and homomorphisms of Cohen-Macaulay modules*, University of Illinois, Urbana, IL. September 2010.
- *Poset Embeddings of Hilbert Functions*, Università degli Studi di Genova, Genova, Italy. June 2010.
- *Poset Embeddings of Hilbert Functions*, University of California, Berkeley, CA. May 2010
- *Poset Embeddings of Hilbert Functions*, AMS Spring Western Section meeting, Albuquerque, NM. April 2010.
- *Regularity of Ext Modules*, algebra seminar, Texas Tech University, Lubbock, TX. April 2010.
- *Arithmetic Rank of Ideals*, colloquium, Texas Tech University, Lubbock, TX. April 2010.
- *Regularity of Canonical and Deficiency modules for Monomial Ideals*, AMS Spring Southeastern Sectional meeting, Lexington, KY. March 2010.
- *Arithmetic Rank of Monomial Ideals*, AMS Fall Central Sectional meeting, Waco, TX. October 2009.
- *Arithmetic Rank of Monomial Ideals*. Purdue-UIUC Algebra, Geometry, Combinatorics Day, UIUC, Urbana, IL. September 2009.
- *Solving Polynomial Equations Using Gröbner Bases*, Undergraduate colloquium, Fairfield University, Fairfield, CT. November 2008.
- *Homological invariants of bipartite edge ideals*, commutative algebra seminar, City University of New York, New York, NY. November 2008.
- *Free resolutions of quadratic monomial ideals*, commutative algebra seminar, University of Nebraska, Lincoln, NE. March 2008.
- *Multiplicity Bounds for Quadratic Monomial Ideals*, Joint Mathematics Meetings, San Diego, CA. January 2008.
- *Multiplicity Conjectures*, seminar, Indian Institute of Science, Bangalore, Karnataka. July 2007.
- *Multiplicity Conjectures*. Graduate Student Research Conference On Algebra And Representation Theory, Kansas State University, Manhattan, KS. May 2006.
- *Some Ideals with Large Projective Dimension*, Cornell University, Ithaca, NY. May 2006.
- *Some Ideals with Large Projective Dimension*, Joint Mathematics Meetings, San Antonio, January 2006.

Other talks / instructional lectures

- AFS Level III, *Galois theory*, Kerala School of Mathematics, Kozhikode, Kerala, July 2018. (future)
- AIS School on *Gröbner basis: theory and applications*, Indraprastha Institute of Information Technology, New Delhi. December 2017.
- ATM Workshop on *Positive characteristic methods in commutative algebra*, IIT-Bombay, Mumbai, Maharashtra. June 2017.
- Instructional School for Teachers, *Commutative Algebra*, St. Joseph's College, Irinjalakuda, Kerala. April-May, 2017.

- *Field extensions and geometry*, Cochin University of Science and Technology, Kerala. March 2017.
- Lectures on Serre duality, Workshop on Seshadri Constants, CMI, Chennai, Tamilnadu, February 2017.
- ATM Workshop on *local cohomology*, St. Joseph's College, Irinjalakuda, Kerala. July 2016.
- Expository lecture on singular value decomposition, Stella Maris College, Chennai, Tamilnadu. February 2016.
- Advanced Training School in Mathematics : Group theory and Ring theory, Madurai Kamaraj University, Madurai, Tamilnadu. January 2016.
- AIS School on *Commutative Algebra*, CMI, Chennai, Tamilnadu, December 2015.
- AFS Level I, IIT-Madras, Chennai, Tamilnadu. December 2014.
- AIS School on *Schemes and Cohomology*, Kerala School of Mathematics, Kozhikode, Kerala, December 2014.
- AIS School on *Algebraic Number Theory*, CMI, Chennai, Tamilnadu, July 2014.
- AFS Level II, *Differential Topology*, Kerala School of Mathematics, Kozhikode, Kerala, May 2014.
- UGC Refresher Programme for Lecturers, University of Mysore, Mysore, Karnataka. December 2013.
- ATM Workshop on *Singularity Categories in Algebraic Geometry and Commutative Algebra*, IIT-Madras, Chennai, Tamilnadu. January 2013.
- ATM School for Lecturers, Kumaon University, Almora, Uttarakhand. February 2012.
- ATM Workshop on *Computational Commutative Algebra and Algebraic Geometry* NIIT University, Neemrana, Haryana. January 2012.
- ATM Workshop on *local cohomology*, IIT-Bombay, Mumbai, Maharashtra. June 2011.

Research visits

- Centre Internationale Recontres Mathematiques, Luminy, France, July 2017.
- University of Utah, Salt Lake City, UT, USA. July 2016
- Northeastern University, Boston, MA, USA. October 2012 and June 2016
- University of Nebraska, Lincoln, NE, USA. April 2014.
- Purdue University, West Lafayette, IN, USA. July 2012 and March 2018.
- American Institute of Mathematics, SQuaREs programme on *Ordinary Powers and Symbolic Powers*, Palo Alto, CA. April 2011, October 2012, April 2014.

Grants

- Department of Science and Technology, India - MATRICS Grant, 2018–
- National Board of Higher Mathematics India Travel Grants: April 2014, June-July 2016.

Professional Activities

- Co-organizer, ATM Workshop on *Positive characteristic methods in commutative algebra*, IIT-Bombay, Mumbai, Maharashtra. June 2017.
- Co-organizer, Instructional School for Teachers, *Commutative Algebra*, St. Joseph's College, Irinjalakuda, Kerala. April-May, 2017.
- Co-organizer, Workshop on Seshadri Constants, CMI, Chennai, Tamilnadu, February 2017.
- Co-organizer, National Conference on Commutative Algebra and Algebraic Geometry, CAAG-2016, IISER Mohali, Punjab. October 2016.
- Co-organizer, AIS School on *Commutative Algebra*, CMI, Chennai, Tamilnadu, December 2015.
- Co-organizer, India-UK Seminar on 'Recent Developments in Commutative Algebra and Applications to Classical Rings' funded by DST and Royal Society, January 2015.
- Co-Organizer: Mathematical Panorama Lecture series: 'Syzygies and Free Resolutions', CMI, Chennai, Tamilnadu, December 2012.
- Thesis supervision:
 - Mitra Koley (PhD, CMI, 2017 submitted).
 - Suprajo Das (MSc, CMI, 2014).
- Dissertation committees:
 - Melissa Lindsey (PhD, Purdue, 2011. adv: G. Caviglia).

- Panelist, *What I wish I had known before I went to graduate school*, organized by the AMS Committee on the Profession, Chair: C. Huneke. AMS-MAA-SIAM Joint Mathematical Meetings, Washington, DC. January 2009.
- Student co-organizer, Math. Awareness Month activities, University of Kansas. 2005–07.
- Panelist, on a discussion on graduate school. Chair: T. Marley, AMS Fall Central Sectional meeting, Lincoln, NE. October 2005.