

## Kangjin Han

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- CONTACT INFORMATION** School of Mathematics,  
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- RESEARCH INTERESTS** Algebraic Geometry with Syzygetic viewpoint and Combinatorial commutative algebra  
Tensor decomposition, Tensor (border) ranks and Geometry of tensors  
Applications to Classical algebraic geometry and Computational problems
- POSITIONS HELD**
- \* 2014.3 – : KIAS Assistant Professor, Korea Institute for Advanced Study (KIAS)
  - \* 2012.3 – 2014.2 : Research fellow, Korea Institute for Advanced Study (KIAS)
  - \* 2010.3 – 2012.2 : Postdoctoral researcher, Algebraic Structure and its Application Research Center (ASARC) in Korea Advanced Institute of Science and Technology (KAIST)
- EDUCATION**
- \* Ph.D. Dept. of Mathematical Sciences, KAIST, 2010.  
Dissertation: *A study on some infinitely generated graded modules, projections, and applications*  
Advisor: Sijong Kwak
  - \* M.A. Dept. of Mathematics, KAIST, 2004.
  - \* B.S. Dept. of Mathematics, KAIST, 2002.
- PUBLICATIONS**
- [1] Kangjin Han, A study on some infinitely generated graded modules, projections, and applications, Ph. D. Dissertation, KAIST (2010).
  - [2] Kangjin Han, Sijong Kwak, Analysis on some infinite modules, inner projection, and applications, *Trans. Amer. Math. Soc.* 364 (2012), no. 11, 5791–5812.
  - [3] Kangjin Han, Classification of secant defective manifolds near the extremal case, *Proc. Amer. Math. Soc.* 142 (2014), no. 1, 39–46.
  - [4] Kangjin Han, Sijong Kwak, Sharp bounds for higher linear syzygies and classifications of projective varieties, *Math. Ann.*, published online (DOI 10.1007/s00208-014-1084-9, arXiv:1304.6376).
  - [5] Kangjin Han, Jeaman Ahn, Linear normality of general linear sections and some graded Betti numbers of 3-regular projective schemes, accepted to *J. Algebra* (arXiv:1404.1757).

SOME ONGOING WORKS

- [6] Kangjin Han (with Jeaman Ahn, Sijong Kwak), Syzygy bound on the  $k$ -th strand of a projective variety and  $k$ -linear resolutions, in preparation.
- [7] Kangjin Han (with Sijong Kwak), Partial elimination ideals and higher order normalities of projective varieties, in preparation.
- [8] Kangjin Han, On singularities of third secant varieties of Veronese embeddings, in preparation.
- [9] Kangjin Han (with Luke Oeding), Staircase flattenings and the border ranks of monomials, in preparation.
- [10] Kangjin Han (with Thanh Vu), Regularity bounds for codimension 3 toric rings, work in progress.
- [11] Kangjin Han (with Sijong Kwak), Projections from lines : the interplay between internal geometry of lines and syzygies of projections, work in progress.
- [12] Kangjin Han, Partial elimination ideal theory and its applications to the graded Betti numbers of projective schemes, work in progress.

OTHER PROFESSIONAL EXPERIENCE

- \* MSRI, Berkeley (US), Research Member (Program: Commutative Algebra), April–May 2013.
- \* KIAS, Seoul (South Korea), Invited visitor (Host: *JongHae Keum*), August–September 2011.
- \* Universität des Saarlandes, Saarbrücken (Germany), Invited visitor (Host: *Frank-Olaf Schreyer*), KOSEF-DAAD Summer Institute Program, July–August 2009.

HONORS, AWARDS & GRANTS

- \* *NRF Basic Science Research Program*, National Research Foundation of Korea (NRF), project : "Multisecants, inner projections, and Eisenbud-Goto regularity conjecture" grant no. : 2012R1A1A2038506 (2012.9–2015.8).
- \* *Science Graduate Research Scholarship*, Korea Student Aid Foundation (KOSAF), 2008. 9–2009. 8.
- \* *Global Leader Scholarship*, 'Kim, Young-Han' Foundation, 2004–2006.
- \* *Undergraduate Student Scholarship Program*, Korea Foundation for Advanced Studies (KFAS), 2000–2001.

CONFERENCES AND SEMINARS ORGANIZED

- \* *KIAS Colloquium in School of Mathematics*, organizer, 2014 Spring semester ~ .
- \* *Winter school on Tensors, geometric approach and its applications*, co-organizer, 2014 February (<http://newton.kias.re.kr/~khan/school2014>).

- \* *Mini-workshop on Algebraic geometry and its Applications*,  
co-organizer, 2014 February  
([http://newton.kias.re.kr/~khan/school2014/site/One\\_day\\_workshop.html](http://newton.kias.re.kr/~khan/school2014/site/One_day_workshop.html)).
- \* *KIAS Algebraic Geometry and Commutative Algebra seminar*,  
organizer, 2013 Fall semester (<http://newton.kias.re.kr/~ag.ca>).
- \* *KAIST Graduate Student Seminar*,  
organizer, 2008.

CONFERENCE  
TALKS

- [1] *Syzygy bound on the  $k$ -th strand of a projective variety and  $k$ -linear resolutions*
  - Invited speaker, Seoul ICM 2014 Satellite conference on Algebraic and Complex Geometry, DCC, Daejeon, August 6-10, 2014.
- [2] *Groebner bases, syzygies and applications*
  - Invited lecture, 2014 Summer School on Algebraic Geometry, Damyang resort, Damyang, June 16-20, 2014.
- [3] *Linear normality of general linear sections and some graded Betti numbers of 3-regular projective schemes*
  - 2014 KMS Spring Meeting, Gangneung-Wonju Nat'l U., Gangneung, April 24-26, 2014.
- [4] *On the higher order normality of projective varieties*
  - Algebraic Geometry in East Asia (AGEA) 2013, Institute of Maths, AMSS, Beijing, China, October 14–18, 2013.
- [5] *Inner projection methods in geometry and syzygies*
  - Invited lecture, The Asian Mathematical Conference (AMC 2013), Bexco, Busan, June 30-July 4, 2013.
- [6] *Geometry and syzygies in the first linear strand*
  - Invited lecture, The 2nd Pacific Rim Mathematical Association Congress (PRIMA 2013), SJTU, Shanghai, China, June 24-28, 2013.
- [7] *Sharp bounds for higher linear syzygies of projective varieties*
  - Younger generations in algebraic and complex geometry II, Saga University, Saga, Japan, December 17–20, 2012.
- [8] *Structures of the linear strands of free resolutions and generalized  $K_{p,1}$ -theorem*
  - Korea-Japan Joint Conference in Algebraic Geometry, Gunsan, August 19–23, 2012.
- [9] *Classification of secant defective manifolds near the extremal case*
  - KMS Spring Meeting, Sookmyung Woman U., Seoul, April 28, 2012.
- [10] *Syzygies of inner projections and graded Betti numbers of quadratic schemes*

- Workshop on Geometry of Projective Varieties, KIAS, Seoul, April 5–7, 2011.
- [11] *On the graded Betti numbers of quadratic schemes*
  - Workshop on Algebraic Geometry, HUFUS, Seoul, March 4–5, 2011.
- [12] *Partial elimination ideals and multiseccants of smooth 3-folds in  $P^5$* 
  - Symposium in Algebraic Geometry, Busan, December 27, 2010.
- [13] *On the syzygies of inner projections and applications*
  - Joint Meeting of KMS-AMS, Ewha Woman U., Seoul, December 16–20, 2009.
- [14] *Inner projections and Regularity conjectures*
  - ASARC workshop, Daecheon, January 29–31, 2009.
- [15] *Syzygetic structures of inner projections : An approach with algebraic methods*
  - Global KMS International Conference, International Convention Center, Jeju, October 23–25, 2008.

SELECTED  
SEMINAR TALKS

- [1] *Syzygy bound on the cubic strand of a projective variety and 3-linear resolutions*
  - Algebraic Geometry Fellow’s Seminar (organizer: C. Ikenmeyer), Simons Institute for Theory of Computing, Berkeley, USA, September 24, 2014.
- [2] *Projection method in syzygies and geometry*
  - Algebraic Geometry Seminar (organizer: G. Ottaviani), U. Florence, Florence, Italy, September 9, 2013.
- [3] *Sharp upper bounds for higher linear syzygies of projective varieties*
  - Commutative Algebra and Algebraic Geometry Seminar (organizer: D. Eisenbud), UC Berkeley, Berkeley, USA, April 23, 2013.
- [4] *On the graded Betti numbers of inner projections*
  - Invited seminar, Korea U., Seoul, November 26, 2010.
- [5] *Multiseccant lines and higher order normalities of projective varieties*
  - Invited seminar, KIAS, Seoul, July 15, 2010.
- [6] *A graded mapping cone construction and linear syzygies of projections*
  - Algebraic geometry seminar, KIAS, Seoul, April 29, 2010.
- [7] *On the behavior of syzygies of a projective scheme under inner projection*
  - ASARC seminar, KAIST, Daejeon, December 8, 2009.
- [8] *Inner projection, Syzygies and Some related properties*
  - Obese seminar “Algebraische Geometrie”(organizer: F.-O. Schreyer), U. Saarlandes, Saarbrücken, Germany, July 22, 2009.

TEACHING

Hannam University:

- Invited Lecturer, Introduction to Linear Algebra, Fall 2011

Chungnam National University:

- Invited Lecturer, Algebra I, Spring 2011

Kongju National University:

- Invited Lecturer, Undergraduate Analysis I, Summer 2010

KAIST:

- Head Teaching Assistant, Calculus I, Spring 2009
- Teaching Assistant, Honor Calculus I, II and Introduction to Linear Algebra, 2002-2006

REFERENCE

Sijong Kwak, Korea Advanced Institute of Science and Technology (KAIST), [skwak@kaist.ac.kr](mailto:skwak@kaist.ac.kr)

JongHae Keum, Korea Institute for Advanced Study (KIAS), [jhkeum@kias.re.kr](mailto:jhkeum@kias.re.kr)

Frank-Olaf Schreyer, Universität des Saarlandes, [schreyer@math.uni-sb.de](mailto:schreyer@math.uni-sb.de)

Aldo Conca, Università di Genova, [conca@dima.unige.it](mailto:conca@dima.unige.it)

Bernd Sturmfels, UC Berkeley, [bernd@math.berkeley.edu](mailto:bernd@math.berkeley.edu)

Fyodor Zak, CEMI, Russian Academy of Sciences, [zak@mccme.ru](mailto:zak@mccme.ru)