

# Cheng Meng | Curriculum Vitae

Yau Mathematical Sciences Center, Tsinghua, Beijing

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## Experience

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**07/2024–**: Postdoc, Yau Mathematical Sciences Center, Tsinghua University. Mentor: Yu Qiu

**01/2024-05/2024**: Postdoc, Simons Laufer Mathematical Sciences Institute (SLMath, formerly MSRI).

**08/2016-12/2023**: Ph.D in Mathematics, Purdue University, USA. Advisors: Giulio Caviglia, Linquan Ma

**08/2012–07/2016**: Bachelor of Science, Tsinghua University, China

## Fellowships, Honors and Grants

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**01/2024-05/2024**: Postdoctoral Fellow, SLMATH

**2022-2023**: Abhyankar Award\*, \$2300, Purdue University

**08/2021-08/2022**: Ross-Lynn Grant (formerly PRF research grant)\*\*, \$31,684, Purdue University

**06/2015**: S. T. Yau Award Silver Medal, Team Award Silver Medal, Chow Award Silver Medal, Hua Award Bronze Medal, S. T. Yau College Student Mathematics Contests\*\*\*

**08/2012–07/2016**: Member of Xuetang Program of Tsinghua University

**01/2012**: Silver Medal at National Math Olympic, China

## Research Interests

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Commutative algebra and its interactions with algebraic geometry, homological algebra and combinatorics.

## Publications and Preprints

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[9]: *Finiteness and infiniteness of gradings of Noetherian rings*, arXiv:2508.01628.

[8]: *Explicit Stillman bounds for all degrees* (with Giulio Caviglia and Yihui Liang), arXiv:2507.19617, submitted.

[7]: *Analysis in Hilbert-Kunz theory*, arXiv:2507.13898, submitted.

[6]: *Asymptotic colengths for families of ideals: an analytic approach* (with Sudipta Das), arXiv:2410.11991, submitted.

[5]:  *$h$ -function, Hilbert-Kunz density function and Frobenius-Poincaré function* (with Alapan Mukhopadhyay), arXiv:2310.10270, submitted.

[4]: *Strongly Lech-independent ideals and Lech's conjecture*, Trans. Am. Math. Soc., <https://doi.org/10.1090/tran/9618>.

[3]: *Local cohomology tables of sequentially almost Cohen-Macaulay modules*, J. Algebra 665 (2025), 596–627.

[2]: *Restrictions on Hilbert coefficients give the depth of a prime ideal inside the polynomial ring*, J. Pure Appl. Algebra 229 (2025) 108144.

[1]: *G-graded irreducibility and the index of reducibility*, Comm. Algebra 48 (2020), no. 2, 826–832.

## Invited Seminar Talks

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**12/26/2024**:  *$h$ -function of local rings of characteristic  $p$* , BIMSAG seminar, BIMSAG

**15/11/2024**:  *$h$ -function of local rings of characteristic  $p$* , Commutative Algebra Seminar in Beijing, AMSS

\* Abhyankar Award is awarded for outstanding thesis work in the area of Commutative Algebra.

\*\*The Purdue Research Foundation (PRF) Research Grants are one-year awards to assist faculty by providing support for PRF Research Assistant at the Ph.D. level for their effort in the development of new or the continuation of ongoing research projects.

\*\*\*When the medals were awarded, S.T.Yau College Student Mathematics Contest was open to undergraduates without a college degree from universities of mainland China, Hong Kong and Taiwan. Now it is also open to undergraduates in other countries.

**16/02/2024:** *h-function of local rings of characteristic  $p$* , COMA seminar at SLMath, SLMath

**11/10/2023:** *Multiplicities in flat local extensions*, Commutative Algebra seminar, University of Utah

**27/10/2023:** *Graded structures in commutative algebra*, Commutative Algebra student seminar, Purdue University

**25/10/2023:** *Properties of  $h$ -function and invariants in characteristic  $p$* , Commutative Algebra seminar, Purdue University

**11/10/2023:** *h-function of local rings of characteristic  $p$* , Algebra seminar at the University of Nebraska-Lincoln, University of Nebraska-Lincoln

**09/10/2023:** *h-function of local rings of characteristic  $p$* , Algebra seminar at University of Missouri, University of Missouri

**11/04/2023:** *Decompositions of local cohomology tables*, Auburn Algebra Seminar, Auburn University

**10/03/2023:** *Multiplicities in flat local extensions*, IIT Bombay Virtual Commutative Algebra Seminar, IIT Bombay, online

**25/10/2022:** *Multiplicities in flat local extensions*, Algebraic geometry/commutative algebra seminar, University of Notre Dame

**15/09/2022:** *Multiplicities in flat local extensions*, Virtual CA Seminar at Michigan, University of Michigan, online

**20/04/2022:** *Strongly Lech-independent ideals and Lech's conjecture*, Commutative Algebra Seminar at UIC, University of Illinois Chicago, online

**11/03/2022:** *The Hilbert-Kunz multiplicity*, Commutative Algebra Student Seminar, Purdue University

**03/03/2022:** *Strongly Lech-independent ideals and Lech's conjecture*, UMN CAAG seminar, University of Minnesota Twin Cities, online

**04/02/2022:** *The Buchsbaum-Eisenbud-Horrocks conjecture*, Commutative Algebra Student Seminar, Purdue University

**01/12/2021:** *Strongly Lech-independent ideals and Lech's conjecture*, Commutative Algebra Seminar, Purdue University

**07/04/2021:** *Boij-Söderberg theory and the decomposition of local cohomology tables of modules*, Commutative Algebra Seminar, Purdue University

**09/09/2019:** *Infinite free resolutions*, Commutative Algebra Student Seminar, Purdue University

**24/04/2018:** *Monomial resolutions*, Commutative Algebra Student Seminar, Purdue University

## Invited Conference Talks

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**16/12/2025:** *Singularities and Limits of  $F$ -invariants*, International Symposium on Applications of Singularities and AI, Sanya

**21/11/2024:** *h-function of local rings of characteristic  $p$* , The 45th Japan Symposium on Commutative Algebra, RIMS, Kyoto

**18/09/2024:** *Lech's conjecture on multiplicities in flat local extensions*, International Workshop on Commutative Algebra and Related Topics, Chern Institute of Mathematics, Tianjin

**06/01/2024:** *h-function of local rings of characteristic  $p$* , Joint Mathematics Meetings, San Francisco

**03/11/2023:** *h-function of local rings of characteristic  $p$* , Algebra Days, Arizona State University

**26/03/2022:** *Strongly Lech-independent ideals and Lech's conjecture*, AMS Spring Central Virtual Sectional Meeting , online

**19/03/2022:** *Strongly Lech-independent ideals and Lech's conjecture*, AMS Spring Eastern Virtual Sectional Meeting , online

## Poster Presentations

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**07/2025:** International conference on commutative algebra to the memory of Jürgen Herzog, VIASM, Hanoi

**09/2023:** Kumunu 2023, University of Missouri

**08/2023:** BrianFest, University of Nebraska-Lincoln

**06/2023:** Commutative Algebra and its Interaction with Algebraic Geometry, University of Notre Dame

**04/2023:** Morgantown Algebra Days, University of West Virginia

**06/2019:** Commutative Algebra and its Interaction with Algebraic Geometry, University of Notre Dame

**02/2019:** Southwest Local Algebra Meeting 2019, University of Texas at El Paso

## Other conferences attended

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**04/2023:** Syzygies and Regularity, Workshop For Graduate Students, Postdocs, and Young Researchers, University of Illinois Chicago

**11/2022:** NSF Workshop on matrix factorizations and related topics, University of Notre Dame

## Seminars (Co)Organized

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**Spring 2022:** *Commutative Algebra Student Seminar*, Purdue University.

## Teaching Experience

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**Fall 2025:** Teaching Assistant, Algebra I given by Prof. Zhiwei Zheng, Tsinghua University

**Spring 2025:** Teaching Assistant, Commutative Algebra given by Prof. Xiang He, Tsinghua University (in English)

**Fall 2024:** Teaching Assistant, Algebra I given by Prof. Chenglong Yu, Tsinghua University

**Fall 2023:** Recitation Instructor, Multivariate Calculus given by Prof. Kaitlyn Hood. Purdue University

**Fall 2019:** Recitation Instructor, Analytic Geometry And Calculus I given by Prof. Kenji Matsuki. Purdue University

## Professional service

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**Referee for:** Journal of Algebra, Bulletin of the London Mathematical Society, Journal of Pure and Applied Algebra

**Reviewer for AMS Mathematical Reviews**

## Other activities

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**16/05/2022-27/07/2022:** Tutorial instructor of ICTP summer school "Graduate Course on Tight Closure of Ideals and its Applications". Homepage of the summer school