

# Dharm Veer

## Curriculum Vitae

### Basic Information

Name Dharm Veer  
Occupation AARMS Post-Doctoral Fellow  
Institution Dalhousie University, Halifax, Canada  
e-mail d.veer@dal.ca  
Homepage <https://cmidharm.github.io/>

### Research Interest

Commutative Algebra, Combinatorics and Algebraic Geometry.

### Academic Positions

May 3, 2024 – **AARMS Postdoctoral fellow**, *Dalhousie University*, Halifax, Canada.  
till date  
November 25, 2022 – April, 2024 **Postdoctoral fellow**, *Indian Institute of Technology Gandhinagar*, Gandhinagar, India.

### Education

2016 – 2023 **Ph.D. in Mathematics**, *Chennai Mathematical Institute*, Chennai, India,  
Thesis title : Homological Invariants of Hibi Rings and Polyominoes.  
Thesis advisor : Prof. Manoj Kummini.  
2014 – 2016 **Master of Science in Mathematics**, *Chennai Mathematical Institute*, Chennai, India.  
2011 – 2014 **Bachelor of Science (Honours) in Mathematics**, *Motilal Nehru College, University of Delhi*, New Delhi, India.  
2011 **12th CBSE Board Examination**, Jawahar Navodaya Vidyalaya, Faridabad, India.

### Research Experience

August, 2016 – **Research Scholar**, CHENNAI MATHEMATICAL INSTITUTE, Chennai, India.  
November, 2022  
May 22 – **Summer Fellow**, CENTRE FOR EXCELLENCE IN BASIC SCIENCES (CBS), Mumbai, India,  
August 6, 2016 Supervisor : Prof. Balwant Singh.  
May 3 – June 2, 2015 **Summer Fellow**, CENTRE FOR EXCELLENCE IN BASIC SCIENCES (CBS), Mumbai, India,  
Supervisor : Prof. Balwant Singh.

---

## Publications/Pre-prints

### Publications

- P. V. Cheri, Deblina Dey, Akhil K, Nirmal Kotal and Dharm Veer. Cohen-Macaulay permutation graphs. To appear in *Math. Scand.*, 2024. arXiv:2305.17343.
- Carmelo Cisto, Francesco Navarra and Dharm Veer. Polyocollection ideals and primary decomposition of polyomino ideals. *J. Algebra*, 2024, 641, pp.498-529. arXiv:2302.08337.
- Dharm Veer. On the linearity of the syzygies of Hibi rings. To appear in *J. Algebra Appl.*, 2023. arXiv:2108.03915.
- Manoj Kummini and Dharm Veer. The  $h$ -polynomial and the rook polynomial of some polyominoes. *Electron. J. Combin.*, 2023, 30(2):P2.6. arXiv:2110.14905
- Manoj Kummini and Dharm Veer. Charney-Davis conjecture for simple thin polyominoes. *Commun. Algebra*, 2023, 51(4):1654–1662. arXiv:2203.03487.

### Submitted

- Rizwan Jahangir and Dharm Veer. Cohen-Macaulay posets of dimension two and permutation graphs, 2023. arXiv:2305.04535.
- Dharm Veer. Green-Lazarsfeld property  $N_p$  for Segre product of Hibi rings, 2021. arXiv:2305.05659.

### In preparation

- Takayuki Hibi and Dharm Veer. Quadratic binomial ideals associated to certain combinatorial objects.
- Mitra Koley, Nirmal Kotal and Dharm Veer. Some positive characteristic invariants of polyomino ideals.

---

## Research Talks and seminar presentations

- Delivered two lectures on *Grothendieck Quot Scheme and Dimension estimates*, Graduate Seminar series on Moduli space of sheaves, IIT Gandhinagar, Gandhinagar. August-September, 2023.
- On EL-shellable posets, Workshop on *Cohen Macaulay simplicial complexes in graph theory*, Chennai Mathematical Institute, Chennai, India. July, 2023.
- On Cohen-Macaulay posets of dimension 2 and permutation graphs, GANIT Seminar, IIT Gandhinagar, India. March 2023.
- On Cohen-Macaulay posets of dimension 2 and permutation graphs, Conference on Commutative Algebra and Algebraic Geometry, IIT Hyderabad, India. February 2023.
- Polyominoes and polyomino ideals, Graduate Seminar, IIT Gandhinagar, India. January 2023.
- On the  $h$ -polynomial and the rook polynomial of some polyominoes, EMS Summer School on Combinatorial Commutative Algebra, Gebze Technical University, Istanbul, Turkey. August 2022.
- On Green-Lazarsfeld property  $N_p$  for Hibi rings, Virtual Commutative Algebra Seminars, IIT Bombay, Mumbai. March 2022. Video. Notes.
- On Green-Lazarsfeld property  $N_p$  for Hibi rings, National symposium on mathematics and applications, IIT Madras, Chennai. December 2021.
- On Green-Lazarsfeld property  $N_p$  for Hibi rings, 4<sup>th</sup> BRICS Mathematics Conference, IISER Tiruvananthapuram, Kerala. December 2021. Video.
- On Green-Lazarsfeld property  $N_p$  for Hibi rings, Research Seminar, CMI, Chennai. September, 2021.

- On  $h$ -Polynomials of Hibi rings, online talk in webinar Series: CATGT. August 2020. Video.
- Delivered three lectures on *Positive Characteristic Commutative Algebra*, Commutative Algebra Seminar, CMI, Chennai. January, 2020.
- Delivered two lectures on *Tate resolutions*, Commutative Algebra Seminar, CMI, Chennai. November, 2019.
- On  $h$ -Polynomials of Hibi rings, Research Seminar, CMI, Chennai. September, 2019.
- Delivered three lectures on *Homological Invariants of Modules*, Commutative Algebra Seminar, CMI, Chennai. April, 2019. Based on Prof. Srikanth Iyengar's lectures.
- Absolute Integral Closure In Positive Characteristic, Mates PhD Research Seminar, CMI, Chennai. March, 2017.

## Teaching Assistantships

- Computational Commutative Algebra, NPTEL Online course. July-November, 2022.  
Course Instructor : Prof. Manoj Kummini.
- Computational Commutative Algebra, NPTEL Online course. July-November, 2021.  
Course Instructor : Prof. Manoj Kummini.
- Computational Commutative Algebra, NPTEL Online course. September-December, 2020.  
Course Instructor : Prof. Manoj Kummini.
- Algebra I, Chennai Mathematical Institute, Chennai, India. August-November, 2019.  
Course Instructor : Prof. Purusottam Rath.
- Madhava Mathematics Competition Nurture Camp, *Invariant theory of finite groups*, CMI, Chennai, India. June 2019.  
Course Instructor : Prof. Manoj Kummini.
- Homological algebra, Chennai Mathematical Institute, Chennai, India. January-April, 2019.  
Course Instructor : Prof. Kumari Saloni.

## Research visit

- Max Planck Institute for Mathematics, Bonn, Germany. Nov - Dec, 2023.
- Sabancı University, Tuzla, Turkey. August, 2022.  
Host : Prof. Ayesha Asloob Qureshi.

## Participation in Workshops/Conferences

- Workshop on *Cohen Macaulay simplicial complexes in graph theory*, Chennai Mathematical Institute, Chennai, India. July, 2023.
- Conference on Commutative Algebra and its interaction with Algebraic Geometry and Combinatorics, VIASM Hanoi, Vietnam. June 2023.
- AIS School on *Topics in Birational Geometry*, Chennai Mathematical Institute, Chennai, India. May-June, 2023.
- Conference on Commutative Algebra and Algebraic Geometry, IIT Hyderabad, India. February 2023.
- EMS Summer School on Combinatorial Commutative Algebra, Gebze Technical University, Istanbul, Turkey. August, 2022.
- A Conference on Topics in Algebraic Geometry and Commutative Algebra, SRM University-AP, Andhra Pradesh, India. July, 2022.
- NCM Workshop on *maximal Cohen-Macaulay Modules*, Chennai Mathematical Institute, Chennai, India. July, 2022.

- 4<sup>th</sup> BRICS Mathematics Conference, IISER Tiruvananthapuram, Kerala, India. December, 2021.
- AIS School on *advanced commutative algebra*, IIT Kharagpur, India. December, 2019.
- Workshop on Hochschild Homology, Chennai Mathematical Institute, Chennai, India. July, 2019.
- NCM Workshop *commutative algebra and algebraic geometry in positive characteristics*, IIT Bombay, Mumbai, India. December, 2018.
- Projective Modules, IIT Bombay, Mumbai, India. May-June, 2018.
- AIS School on *Gröbner Bases and their Applications*, IIIT Delhi, New Delhi, India. December, 2017.
- ATM Workshop on *positive Characteristic Methods in Commutative Algebra*, IIT Bombay, Mumbai, India. June, 2017.
- Workshop on Seshadri constants, Chennai Mathematical Institute, Chennai, India. February, 2017.
- AIS School on commutative Algebra, Chennai Mathematical Institute, Chennai, India. December, 2015.

## Awards and Achievements

- May 3, 2024 – **AARMS Postdoctoral fellowship.**  
till date Awarded by AARMS, Canada.
- August, 2018 – **Senior Research Fellowship.**  
November, 2022 Awarded by Chennai Mathematical Institute, Chennai, India.
- August, 2016 – **Junior Research Fellowship.**  
July, 2018 Awarded by Chennai Mathematical Institute, Chennai, India.
- August, 2014 – **Postgraduate Scholarship.**  
April, 2016 Awarded by Chennai Mathematical Institute, Chennai, India.
- 2016 **Selected for PhD in IISER Pune (didn't avail)..**
- 2016 **Qualified Graduate Aptitude Test in Engineering(GATE).**  
Conducted by Indian Institute of Technology (IIT).
- December 2015 **73rd Rank in CSIR-JRF Dec-2015 Mathematical Science test.**  
Conducted by CSIR-UGC for Junior Research Fellowship and eligibility for lectureship.
- December 2014 **44th Rank in CSIR-NET Dec-2014 Mathematical Science test.**  
Conducted by CSIR-UGC for eligibility for lectureship.
- 2014 **62nd Rank in IIT – JAM 2014 Mathematics subject test.**  
Conducted by Indian Institute of Technology (IIT) for Master's programme in Mathematics.
- 2004 – 2011 **Free Education and Accommodation From Class 6th to 12th.**  
Awarded by HRD Ministry of India on the Basis of Aptitude Test.