

Postdoctoral Fellow, Department of Physics & Astronomy  
University of Victoria, British Columbia, Canada

Email: [ajainphysics@gmail.com](mailto:ajainphysics@gmail.com)

Website: <https://ajainphysics.com>

Mailing Address: Room 206, Elliott Building, 3800 Finnerty Road, Victoria, BC  
V8P 5C2, Canada

**Born:** June 14, 1993  
Shikohabad, India

**Nationality:** Indian

**Languages:** Hindi (Native)  
English (Proficient)

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## ► Academic Timeline & Education

- [2018-] **Post-Doctoral Fellow** at UNIVERSITY OF VICTORIA, British Columbia, Canada.
  - Supervisor: PROF. PAVEL KOVTUN, Department of Physics & Astronomy.
- [2014-18] **PhD (Mathematics)** at CENTRE FOR PARTICLE THEORY, DURHAM UNIVERSITY, UK.
  - Thesis: *A Universal Framework for Hydrodynamics*. [[ePrint](#)]
  - Supervisor: PROF. RUTH GREGORY, Department of Mathematical Sciences.
- [2009-14] **BS-MS (Dual Degree)** — Physics major and Mathematics minor (*Gold Medallist*) at INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER) BHOPAL, India.
  - Dissertation: *Holographic Ferromagnetism and Non-Relativistic Charged Hydrodynamics*. [[ePrint](#)]
  - Supervisor: DR. SUVANKAR DUTTA, Department of Physics.
  - CGPA: **9.41/10** (highest in the graduating batch).

## ► Fellowships & Distinctions

- [2014-18] Recipient of DURHAM DOCTORAL SCHOLARSHIP (Faculty of Science).
- [2014] Recipient of PHYSICS PROFICIENCY GOLD MEDAL for best academic performance in the graduating batch at IISER Bhopal.
- [2014] Recipient of DIRECTOR'S GOLD MEDAL for outstanding all round achievement and leadership skills at IISER Bhopal.
- [2012] Recipient of DAAD-WISE Scholarship offered by DAAD (German Academic Exchange Service) for a funded internship at RWTH Aachen University, Germany.
- [2012] Selected for IASC-INSA-NASI SUMMER RESEARCH FELLOWSHIP offered by Indian Academy of Sciences (IAS) for a funded internship at Jamia Millia Islamia University, Delhi.
- [2009-14] Recipient of INSPIRE scholarship offered by Ministry of Human Resource Development (MHRD), Government of India.

## ► Achievements

- [2013] Secured all India **23rd** rank in CSIR-UGC NET examination conducted by Council of Scientific & Industrial Research (CSIR), Govt. of India.
- [2013] Secured all India **45th** rank in IIT-GATE examination conducted by Indian Institute of Technology (IIT).
- [2013] Scored **990/990** in PHYSICS GRE Test administered by ETS.
- [2009] Qualified IIT-JEE entrance examination with All India **98th percentile**.

## Research

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### ► Publications

- [2018] J. Armas and A. Jain, *One-form superfluids and magnetohydrodynamics*, [1811.04913](#).
- [2018] J. Armas and A. Jain, *Magnetohydrodynamics as superfluidity*, [1808.01939](#).
- [2018] P. Burda, R. Gregory and A. Jain, *Holographic Reconstruction of Bubbles*, *Phys. Rev. D* **99** (2019) 026003, [[1804.05202](#)].
- [2018] J. Armas, J. Gath, A. Jain and A. V. Pedersen, *Dissipative hydrodynamics with higher-form symmetry*, *JHEP* **05** (2018) 192, [[1803.00991](#)].
- [2017] N. Banerjee, S. Atul Bhatkar and A. Jain, *Second order Galilean fluids and Stokes' law*, *Phys. Rev. D* **97** (2018) 096018, [[1711.09076](#)].
- [2017] J. Armas, J. Bhattacharya, A. Jain and N. Kundu, *On the surface of superfluids*, *JHEP* **06** (2017) 090, [[1612.08088](#)].

- [2017] N. Banerjee, S. Dutta and A. Jain, *First Order Galilean Superfluid Dynamics*, *Phys. Rev.* **D96** (2017) 065004, [[1612.01550](#)].
- [2017] A. Jain, *Theory of non-Abelian superfluid dynamics*, *Phys. Rev.* **D95** (2017) 121701, [[1610.05797](#)].
- [2016] A. Jain, *Galilean Anomalies and Their Effect on Hydrodynamics*, *Phys. Rev.* **D93** (2016) 065007, [[1509.05777](#)].
- [2016] N. Banerjee, S. Dutta and A. Jain, *Null Fluids - A New Viewpoint of Galilean Fluids*, *Phys. Rev.* **D93** (2016) 105020, [[1509.04718](#)].
- [2015] N. Banerjee, S. Dutta and A. Jain, *Equilibrium partition function for nonrelativistic fluids*, *Phys. Rev.* **D92** (2015) 081701, [[1505.05677](#)].
- [2015] N. Banerjee, S. Dutta and A. Jain, *Higher Derivative Corrections to Charged Fluids in 2n Dimensions*, *JHEP* **05** (2015) 010, [[1502.00142](#)].
- [2014] N. Banerjee, S. Dutta, A. Jain and D. Roychowdhury, *Entropy current for non-relativistic fluid*, *JHEP* **08** (2014) 037, [[1405.5687](#)].
- [2013] S. Dutta, A. Jain and R. Soni, *Dyonic Black Hole and Holography*, *JHEP* **12** (2013) 060, [[1310.1748](#)].

More details can be found on the [INSPIRE-HEP database](#).

## Academic Experience

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### ► Academic Visits

- [2016-18] PERIMETER INSTITUTE, Canada — invited by Prof. Ruth Gregory for three months every year.
- [2017] INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER) PUNE, India — invited by Dr. Nabamita Banerjee for a week.
- [2015] INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS (ICTP), Italy — invited by Dr. Suvankar Dutta for a week.
- [2014] INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER) PUNE, India — invited by Dr. Nabamita Banerjee for a month.
- [2012] INSTITUTE FOR THEORETICAL PARTICLE PHYSICS AND COSMOLOGY, RWTH AACHEN UNIVERSITY, Germany — invited by Prof. Björn Garbrecht for a summer internship lasting three months.
- [2011] CENTER FOR THEORETICAL PHYSICS, JAMIA MILLIA ISLAMIA UNIVERSITY, Delhi — invited by Prof. Mohd. Sami for a summer internship lasting a month.

### ► Teaching

- [2018-19] Supervised reading projects for MSc students on QUANTUM FIELD THEORY IN CURVED SPACETIME, 2D CONFORMAL FIELD THEORY, and THERMAL FREEZE-OUT OF DARK MATTER at University of Victoria.
- [2017-18] Tutor for second year courses ANALYSIS IN MANY VARIABLES II and MATHEMATICAL MODELLING II, and first year course PROGRAMMING I at Durham University.
- [2016-17] Tutor for first year course SINGLE MATHS B at Durham University.
- [2015-16] Tutor for first year course CALCULUS, and marker for first year courses CALCULUS and SINGLE MATHS A at Durham University.

### ► Talks & Seminars Delivered

- [2018] Harish-Chandra Research Institute (HRI) Allahabad, India — String theory group talk titled *Magnetohydrodynamics and one-form superfluidity*. [[Slides](#)]
- [2018] Indian Institute of Science Education and Research (IISER) Bhopal, India — Physics department seminar titled *Magnetohydrodynamics and one-form superfluidity*. [[Slides](#)]
- [2018] Tata Institute of Fundamental Research (TIFR) Mumbai, India — String theory and mathematical physics seminar titled *Magnetohydrodynamics and one-form superfluidity*. [[Slides](#)]
- [2018] Indian Institute of Science Education and Research (IISER) Pune, India — String theory seminar titled *Magnetohydrodynamics and one-form superfluidity*. [[Slides](#)]
- [2017] Durham University, UK — HEP Student Seminar titled *A field theorist's take on fluid dynamics*. [[Slides](#)]
- [2017] Perimeter Institute for Theoretical Physics, Canada — String theory group meeting talk titled *Holographic Reconstruction of Gravitational Instantons*.
- [2015] International Centre for Theoretical Physics (ICTP), Italy — HEP Seminar titled *Galilean Fluids Through Null Reduction*. [[Slides](#)]
- [2015] Galileo Galilei Institute for Theoretical Physics, Italy — Gong show titled *Anomalies and Null Reduction*.

- [2015] Durham University, UK — HEP Student Seminar titled *Galilean Fluids Through Null Reduction*. [[Slides](#)]
- [2015] STRINGS Conference & Advanced Strings School, International Centre for Theoretical Sciences (ICTS), Bangalore, India — Poster titled *Non-Relativistic Fluids through Light Cone Reduction*. [[ePrint](#)]
- [2014] Young Theorists Forum, Durham University, UK — Seminar titled *Entropy Current of Non-relativistic Fluid*. [[Slides](#)]
- [2014] Inter-IISER and NISER Physics Meet, IISER Pune, India — Seminar titled *Study of Charged Non-relativistic Fluids using Light Cone Reduction*. [[Slides](#)]

#### ► Schools & Conferences Attended/Organised

- [2019] TESTING GRAVITY 2019 organised by Simon Fraser University, Canada.
- [2014-18] *Organiser* of the annual YOUNG THEORISTS FORUM (YTF) at Durham University, UK.
- [2017] GRAVITY AND BLACK HOLES – STEPHEN HAWKING 75TH BIRTHDAY CONFERENCE organised by Centre for Theoretical Cosmology, University of Cambridge, UK.
- [2016] V POSTGRADUATE MEETING ON THEORETICAL PHYSICS organised by University of Oviedo, Spain.
- [2015] LEZIONI AVANZATE DI CAMPI E STRINGHE (LACES) 2015 organised by Galileo Galilei Institute for Theoretical Physics (GGI), Italy.
- [2015] HOLOGRAPHY: ENTANGLED, APPLIED, AND GENERALISED organised by Niels Bohr Institute (NBI), Denmark.
- [2015] STRINGS 2015 organised by Indian Institute of Science (IISc), Bangalore and International Centre for Theoretical Sciences (ICTS), India.
- [2015] ADVANCED STRINGS SCHOOL 2015 organised by Indian Institute of Science (IISc), Bangalore and International Centre for Theoretical Sciences (ICTS), India.
- [2011] 6TH WINTER SCHOOL ON ASTROPARTICLE PHYSICS (WAPP) organised by Bose Institute Kolkata and TIFR Mumbai, India.
- [2010] INDIGO SCHOOL ON GRAVITATIONAL WAVE ASTRONOMY (ISGWA) organised by IndIGO (Indian Initiative on Gravitational Oscillations) Programme, IUCAA Resource Centre at Delhi University, India.

#### ► Referee in International Scientific Journals

- International Journal of Modern Physics D.

### Interests & Extra-Curricular Activities

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#### ► Science Outreach

- [2016] VOLUNTEER on behalf of the mathematics department for *Celebrate Science* — an annual event organised by Durham University, aiming to get primary school children excited and involved with science.
- [2014] COORDINATOR for IISER Bhopal's first science fest — *Singularity*.
- [2013/14] STUDENT COORDINATOR of IISER Bhopal's *outreach program* aimed at providing scientific research exposure to high school students.
- [2013] EDITOR of IISER Bhopal's physics newsletter — *Geodesics* (February 2013 issue).
- [2010-11] FOUNDING MEMBER and SECRETARY of IISER Bhopal's science club.
- [2010] VOLUNTEER for INSPIRE Internship Program aimed at providing hands on scientific experience to high school students held at Miranda House College, Delhi University.

#### ► Administration

- [2015-17] PG IT REPRESENTATIVE at Dept. of Mathematical Sciences, Durham University for two years.
- [2015-17] FRESHERS' REPRESENTATIVE for Hatfield College MCR, Durham University for three years, charged with management of new postgraduates arriving in the college.
- [2014-17] IT OFFICER at Hatfield College MCR, Durham University for three years.
- [2011-12] FOUNDING MEMBER of Students Activity Council (SAC), IISER Bhopal and SECRETARY of its Constitution Drafting Board in 2011. VICE-PRESIDENT of SAC in its first session.
- [2011] Member of the EDITORIAL BOARD of IISER Bhopal's annual magazine — Uday (2011 edition).
- [2010-13] WEBMASTER for SAC, IISER Bhopal for three years.
- [2010/12] EVENT COORDINATOR for IISER Bhopal's second cultural fest — *Enthuzia* in 2012 and member of the organising team for its first instalment in 2010.

► **Web Development** — I invest much of my free time experimenting with web technologies. I have taught myself various web languages including HTML, CSS, JavaScript, JSON, PHP, and MySQL, along with third-party frameworks like Bootstrap, WordPress, Drupal, Dropbox API, and Google Apps Script.