Vatsal Sanjay — PhD

Department of Physics, Durham University
PI, Computational Multiphase Physics Lab
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Date of birth: Feb. 5, 1996 Updated: June 1, 2025

Education

Physics of Fluids Dept. **Univ. Twente**
Ph.D. (Appl. Phys.), Graduated cum laude (with distinction) *2018–2022*
Supervisor: Prof. Detlef Lohse.
Thesis: *Viscous free-surface flows* (OA) 10.3990/1.9789036554077.

Two-Phase Flow & Instability Lab **IIT Roorkee**
B.Tech (Mech.) & M.Tech (Thermal Eng.), Graduated with distinction (CGPA: 9.1/10) *2013–2018*
Supervisor: Prof. Arup Kumar Das,
Thesis: *Understanding of mutual interactions between liquid jets* (OA) 10.13140/RG.2.2.22294.04166.

Professional Experience

Department of Physics **Durham University**
Assistant Professor, PI of Computational Multiphase Physics (CoMPhy) Lab *2025–present*
Leading research on multiphase flows and soft matter dynamics.

Physics of Fluids Dept. **Univ. Twente**
Postdoctoral Researcher, Led Computational Multiphase Physics (CoMPhy) Lab *2022–2025*
Worked on non-Newtonian free-surface flows and soft matter singularities.

Fluid Mechanics & Acoustics Lab (UMR 5509) **Univ. Claude Bernard Lyon 1, France**
Research Intern *May–July, 2016*
Worked on Landau–Levich dip coating.

Major Awards & Achievements

Ammodo Science Fellowship *2025*
To study mycofluidic transport.

J. Fluid Mech. Outstanding Reviewer *2024*
Top 1% of reviewers in 2023.

KIVI Hoogendoorn Fluid Mechanics Award *2024*
Best PhD thesis in Netherlands (2022–2023).

***Young Scientist**, nominated by KNAW* *2024*
73rd Lindau Nobel Laureate Meeting (one of seven from Netherlands).

***Doctor cum laude**, met lof (with distinction)* *2022*
Top 5% of PhD graduates in 2021–2022.

Department Gold Medal *2018*
For academic excellence at IIT Roorkee.

Summer Undergraduate Research Award *2015*
To study bubble entrainment by impinging liquid jet.

Service to the Community

Seminars & Conferences

Physics of Fluids weekly seminar — **Univ. Twente**
avg. 40 participants, 10+ international speakers/yr, link. — *2022–2025*

Symposium on *Bubbles & Bubbly Flows* — **Univ. Twente**
75 participants. — *May 2025*

Workshop on *(De)Constructing Complex Contact Lines* — **Lorentz Center**
25 participants, link. — *Jun 2024*

35th Dutch Soft Matter Meeting — **Univ. Twente**
100 participants; received NWO Meetings Grant. — *May 2024*

Flow for Future conference: 25 years of Physics of Fluids — **Univ. Twente**
200 participants. — *Oct 2023*

Refereeing

2018–Now: J. Fluid Mech. (80+), Phys. Rev. (20+), PNAS (3), among others.

Research Funding

2025: Ammodo Science Fellowship (€170000) for Mycofluidic transport (embargo until Feb. 2025).
2023: 10 million CPU hours (€150000 equivalent) on Snellius HPC (Co-PI).

Scientific Outreach

2020–2025: Social media manager for Physics of Fluids Dept. at BlueSky & X.
2022–Now: APS-DFD peer mentoring (mentor).
2022–Now: Skype a Scientist (high-school outreach).
2022–2023: Physicist To-Go (APS).
2021: Panel discussion on *Future of Fluid Dynamics*.
2021: Panel discussion on *Research & Higher Education*. [Video].

Supervision

PhD Theses

J. Talukdar: Singularities with surfactants (since Jul. 2025).
S. Jana: Soft impacts (since Jun. 2025).
A. Bhargava: Inertial contact lines (since Jan. 2024).
A. Dixit: Non-Newtonian flows (since Jul. 2023).

Master Theses

F. Hoek (UT, ongoing), S. Jana (IIT KGP, '25, 🎓), J. Talukdar (UT, '25), V. Rosario (UvA, '24, 🎓), S. van den Heuvel (UT, '23, 🎓), C.H. Maurits (UvA, '23, 🎓), T. Appleford (UvA, '22, 🎓), S. Meuleman (UT, '20, 🎓).

Bachelor Theses

M. Sent (UT, '25, 🎓), N. Kuipers (UT, '23, 🎓), J. Talukdar (UT, '23), T. Heijink (UT, '21, 🎓), T. Kroeze (UT, '20, 🎓), C. Verschuur (UT, '20, 🎓), P.J. Dekker (UT, '19, 🎓), L. Bruggink (UT, '19, 🎓).

Teaching

High-Fidelity Simulations Using Basilisk C — **Universidad Carlos III de Madrid, Spain**
Instructor — *Mar. 10–13, 2025*
4-day interactive course on computational fluid dynamics. Also available as self-paced course at comphy-lab.org.

Advanced Fluid Mechanics — **Univ. Twente**
Co-lecturer — *2018–2025*

For complete teaching activities, visit comphy-lab.org/teaching.

Peer-Reviewed Publications

1. Aleksandr Bashkatov, Florian Bürkle, Çayan Demirkır, Wei Ding, **Vatsal Sanjay**, Alexander Babich, Xuegeng Yang, Gerd Mutschke, Jürgen Czarske, Detlef Lohse, Dominik Krug, Lars Büttner, and Kerstin Eckert,
Electrolyte droplet spraying in H_2 bubbles during water electrolysis under normal and microgravity conditions,
Nat. Commun., 16, 4580 (2025) [10 pages];
(OA) DOI: 10.1038/s41467-025-59762-7.

2. Ayush K. Dixit, Alexandros T. Oratis, Konstantinos Zinelis, Detlef Lohse, and **Vatsal Sanjay**,
Viscoelastic Worthington jets and droplets produced by bursting bubbles,
J. Fluid Mech., 1010, A2 (2025) [32 pages];
(OA) DOI: 10.1017/jfm.2025.237.

3. **Vatsal Sanjay** and Detlef Lohse,
Unifying theory of scaling in drop impact: Forces & maximum spreading diameter,
Phys. Rev. Lett., 134, 104003 (2025) [9 pages];
(OA) DOI: 10.1103/PhysRevLett.134.104003.

4. **Vatsal Sanjay**, Bin Zhang, Cunjing Lv, and Detlef Lohse,
The role of viscosity on drop impact forces on non-wetting surfaces,
J. Fluid Mech., 1004, A6 (2025) [23 pages];
(OA) DOI: 10.1017/jfm.2024.982.

5. Lohit Kayal, **Vatsal Sanjay**, Nikhil Yewale, Anil Kumar, and Ratul Dasgupta,
Focusing of concentric free-surface waves,
J. Fluid Mech., 1003, A14 (2025) [39 pages];
(OA) DOI: 10.1017/jfm.2024.1089.

6. Arivazhagan G. Balasubramanian, **Vatsal Sanjay**, Maziyar Jalaal, Ricardo Vinuesa, and Outi Tammisola,
Bursting bubble in an elasto-viscoplastic medium,
J. Fluid Mech., 1001, A9 (2024) [36 pages];
(OA) DOI: 10.1017/jfm.2024.1073;
Cover of that volume of J. Fluid Mech.

7. **Vatsal Sanjay**, Pierre Chantelot, and Detlef Lohse,
When does an impacting drop stop bouncing?,
J. Fluid Mech., 958, A26 (2023) [20 pages];
(OA) DOI: 10.1017/jfm.2023.55.

8. **Vatsal Sanjay**, Srinath Lakshman, Pierre Chantelot, Jacco H. Snoeijer, and Detlef Lohse,
Drop impact on viscous liquid films,
J. Fluid Mech., 958, A25 (2023) [28 pages];
(OA) DOI: 10.1017/jfm.2023.13.

9. Bin Zhang, **Vatsal Sanjay**, Songlin Shi, Yinggang Zhao, Cunjing Lv, Xi-Qiao Feng, and Detlef Lohse,
Impact forces of water drops falling on superhydrophobic surfaces,
Phys. Rev. Lett. 129, 104501 (2022) [7 pages],
DOI: 10.1103/PhysRevLett.129.104501, OA: 10.48550/arXiv.2202.02437;
see also
   - As of March/April 2024, this *highly cited paper* received enough citations to place it in the top 1% of the academic field of Physics based on a highly cited threshold for the field and publication year. Source: Web of Science.
   - Editor's Suggestion of that issue.
   - Davide Castelvecchi, Research Highlight: "The physics of a bouncing droplet's impact", Nature, article: d41586-022-02302-w (29/8/2022)

10. **Vatsal Sanjay**, Uddalok Sen, Pallav Kant, and Detlef Lohse,
Taylor-Culick retractions and the influence of the surroundings,
J. Fluid Mech. 948, A14 (2022) [37 pages];
(OA) DOI: 10.1017/jfm.2022.671.

11. **Vatsal Sanjay**, Detlef Lohse, and Maziyar Jalaal,
Bursting bubble in a viscoplastic medium,
J. Fluid Mech. 922, A22 (2021) [24 pages];
(OA) DOI: 10.1017/jfm.2021.489.

12. Olinka Ramirez-Soto, **Vatsal Sanjay**, Detlef Lohse, Jonathan T. Pham, and Doris Vollmer,
Lifting a sessile oil drop with an impacting one,
Sci. Adv. 6, eaba4330 (2020) [11 pages];
(OA) DOI: 10.1126/sciadv.aba4330.

13. Abhinav Jain, **Vatsal Sanjay**, and Arup Kumar Das,
Consequences of inclined and dual jet impingement in stagnant liquid and stratified layers,
AIChE J. 65(1), 372-384 (2019) [12 pages],
DOI: 10.1002/aic.16373, OA: archived pdf.

14. Anurag Soni, **Vatsal Sanjay**, and Arup Kumar Das,
Formation of fluid structures due to jet-jet and jet-sheet interactions,
Chem. Eng. Sci. 191, 67-77 (2018) [11 pages],
DOI: 10.1016/j.ces.2018.06.055, OA: archived pdf.

15. **Vatsal Sanjay** and Arup Kumar Das,
Numerical assessment of hazard in compartmental fire having steady heat release rate from the source,
Build. Simul. 11(3), 613-624 (2018) [12 pages],
DOI: 10.1007/s12273-017-0411-y, OA: archived pdf.

16. **Vatsal Sanjay** and Arup Kumar Das,
On air entrainment in a water pool by impingement of a jet,
AIChE J. 63(11), 5169–5181 (2017) [23 pages],
DOI: 10.1002/aic.15828, OA: archived pdf.

17. **Vatsal Sanjay** and Arup Kumar Das,
Formation of liquid chain by collision of two laminar jets,
Phys. Fluids 29, 112101 (2017) [12 pages];
DOI: 10.1063/1.4998288, OA: archived pdf.

Works Under Review / In Preparation

1. Çayan Demirkır, Rui Yang, Aleksandr Bashkatov, **Vatsal Sanjay**, Detlef Lohse, and Dominik Krug,
   To jump or not to jump: Adhesion and viscous dissipation dictate the detachment of coalescing wall-attached bubbles,
   submitted to Phys. Rev. Lett.,
   (OA) DOI: 10.48550/arXiv.2501.05532.

2. Josephine Mclauchlan, Jessica S. Walker, **Vatsal Sanjay**, Maziyar Jalaal, Jonathan P. Reid, Adam M. Squires, and Anton Souslov,
   Bouncing microdroplets on hydrophobic surfaces,
   arXiv preprint,
   (OA) DOI: 10.48550/arXiv.2503.22527.

3. **Vatsal Sanjay**, Aleksandr Bashkatov, Çayan Demirkır, Kerstin Eckert, Dominik Krug, and Detlef Lohse,
   Worthington jet injects droplets during coalescence of asymmetric bubbles,
   to be submitted to J. Fluid Mech., click here for results.

4. Vincent Bertin, **Vatsal Sanjay**, Charu Datt, Alexandros T. Oratis, Jacco H. Snoeijer,
   Elastic Taylor-Culick retraction,
   to be submitted to Phys. Rev. Lett., click here for results.

5. Jnandeep Talukdar, Uddalok Sen, Christian Diddens, Detlef Lohse, **Vatsal Sanjay**,
   Sliding drops on dry & wet substrates,
   to be submitted to Phys. Rev. Fluids, click here for results.

6. Saumili Jana, John Kolinski, Detlef Lohse, and **Vatsal Sanjay**,
   Impacting spheres: from liquid drops to elastic beads,
   to be submitted to Soft Matter, click here for results.

Invited & Contributed Talks

Invited Talks

- (Apr. 2025) *Hydrodynamic singularities in soft matter flows*
  Wageningen University & Research (WUR), Netherlands.

- (Mar. 2025) *Can polymeric flows be the Drosophila of continuum mechanics?*
  Condensed Matter Physics Seminar Series, Durham University, UK.

- (Jan. 30, 2025) *Can polymeric flows be the Drosophila of unsteady continuum mechanics?*
  University of Illinois at Urbana-Champaign, US (Virtual).

- (Jan. 20, 2025) *Hydrodynamic singularities in soft matter flows*
  DAMTP, University of Cambridge, UK.

- (Jan. 6, 2025) *Can polymeric flows be the Drosophila of unsteady continuum mechanics?*
  Chaotic Flows in Polymer Solutions workshop, Univ. of Edinburgh, UK.

- (Oct. 9, 2024) *Hydrodynamic singularities in soft matter flows*
  Univ. of Warwick, UK.

- (May 30, 2024) *Viscous free-surface flows*
  Bugers Symposium (NL).

- (Apr. 12, 2024) *Soft matter singularities*
  Univ. of Edinburgh, Scotland.

- (Mar. 4, 2024) *Deformable soft matter*
  Dynamics of Interfaces, Univ. of Augsburg, Germany.
- (Jan. 20, 2023) *Impact of droplets*
  Univ. Claude Bernard Lyon 1, France.
- (Jan. 10, 2023) *Impact of droplets*
  IIT Delhi, India.
- (Jan. 4, 2023) *Impact of droplets*
  IIT Patna, India.
- (Dec. 26, 2022) *Taylor-Culick retractions*
  IIT Kharagpur, India.
- (Dec. 12, 2022) *Taylor-Culick retractions*
  IIT Roorkee, India.
- (Dec. 7, 2022) *Drop impact forces*
  IIT Bombay, India.
- (Oct. 26, 2022) *Drop impact forces*
  CFSM Seminar Series (Virtual).
- (Oct. 12, 2022) *Drop impact forces*
  Virtual Univ. of Arkon.
- (Jul. 10, 2022) *Precursor films help simulate three-phase flows*
  Physics of Fluids Soft Matter Seminar, Univ. of Twente. [Video].
- (Jan. 8, 2018) *Formation of liquid chain by collision of two laminar jets*
  Univ. of Twente.
- (Mar. 27, 2017) *Understanding of mutual interactions between liquid jets...*
  Cognizance Fest, IIT Roorkee.

Selected Contributed Talks

- (Nov. 24, 2024) *Dissipative anomaly in sliding drops*, APS-DFD, Salt Lake City, USA.
- (Sep. 25, 2024) *Drop Impact Forces*, 12th Liquid Matter Conf., Mainz, Germany.
- (Sep. 16, 2024) *A unifying approach for drop impact dynamics on rigid surfaces*, 1st EFDC, Aachen.
- (Apr. 9, 2024) *Bursting bubbles in a viscoelastic medium*, European Rheology Conf., Leeds, UK.
- (Nov. 21, 2023) *A unifying approach for droplet impact forces*, APS-DFD, Washington, DC, USA.
- (Nov. 21, 2022) *Impact forces of water drops.*, APS-DFD, Indianapolis, USA.
- (Jul. 7, 2023) *Viscous free-surface flows*, Basilisk/Gerris Meeting, Paris, France.
- (Sep. 14, 2022) *When does an impacting drop stop bouncing?*, EFMC14, Athens, Greece.
- (Nov. 21, 2021) *Viscous dissipation dictates Taylor-Culick type retractions*, APS-DFD, Phoenix. [Video].
- (Nov. 22, 2020) *When does a viscous drop stop bouncing?*, APS-DFD (virtual). [Video].
- (Dec. 13, 2020) *Bursting Bubble in a Viscoplastic medium*, International Congress on Rheology (virtual). [Video].

- (Feb. 10, 2020) *Jumping & Bouncing Drops & Bubbles*, Max Planck meeting, Mainz.
- (Nov. 23, 2019) *Droplet Encapsulation*, APS-DFD, Seattle.
- (Sep. 18, 2019) *Bursting Bubbles: from Champagne to Mudpots*, VPF8, Cambridge, UK.
- (Aug. 23, 2019) *Impinging drop lifts a sessile drop*, 9th 4U Summer School, Denmark.
- (May 24, 2016) *On gas-liquid entrainment by impinging jet*, ICMF9, Florence, Italy.

Summary of Key Numbers (as of June 1, 2025)

- **Researcher ID:** K-1856-2019
- **Orcid:** 0000-0002-4293-6099
- **Hirsch-index:** H = 9 (Google Scholar), 7 (Web of Science)
- **i10-index:** 8 (Google Scholar)
- **Research Interest Score:** 1000+ (top 2% among ResearchGate members who first published in 2015.)