# Abhimanyu Pallavi Sudhir

AI and game theory researcher.

## Formal education

- University of Warwick · PhD Computer Science · 2022-26 – supervisor: Long-Tran-Thanh
- Imperial College London · MSci Mathematics · 2018-22 – 1st class honors
- Dhirubhai Ambani International School, Mumbai · IB Diploma · 2013-18 – 44/45
- NUS High School, Singapore · 2012-13
- Bukit View Primary School, Singapore · 2006-11

## Internships

- Goldman Sachs · AI Research Intern · Jan-Aug 2021, London – Developed and implemented novel methods in NLP and recurrent neural networks for financial forecasting
- Jane Street · Spring Week · 14-17 Apr 2020 – [cancelled due to COVID-19 lockdowns]
- Schroders · Spring Week · 12-13 Aug 2020 – [held virtually due to COVID-19 lockdowns]
- Jane Street · Fall Insight Day · 30 Oct 2018

## Research

### Markets and AI (PhD work)

My current work focuses on building an algorithmic model of market dynamics to design AI agents with a market-based structure, and developing prediction market mechanisms to elicit beliefs about latent space variables to boost interpretability.

- Abhimanyu Pallavi Sudhir and Long-Tran Thanh (2024), "Betting on what is neither verifiable nor falsifiable", arxiv.org/abs/2402.14021
- Abhimanyu Pallavi Sudhir (2021), "A mathematical definition of property rights in a Debreu economy", arxiv.org/abs/2107.09651

> *Related write-ups and talks.*
>
> — Blog posts
>
> – "Betting on what is un-falsifiable and un-verifiable" (2023) on LessWrong
> – "Meaningful things are those the universe possesses a semantics for" (2022) on LessWrong
>
> — PhD formal reports and presentations
>
> – Year 1 Annual Report abhimanyu.io/legacy_writing/PhD_reports/y1_annual_report.pdf
> – PhD proposal abhimanyu.io/legacy_writing/PhD_reports/y0_proposal.pdf
>
> — Miscellaneous presentations
>
> – "Mechanism design for AI alignment" [poster at the Co-operative AI Foundation (CAIF) summer workshop, 2023]: abhimanyu.io/legacy_writing/PhD_presentations/caif.pdf
> – "Betting on what is neither verifiable nor falsifiable" [Warwick Postgraduate colloquium (Dec 2023) & Warwick Cake Talk (Nov 2023)]: abhimanu.io/legacy_writing/PhD_presentations/betting_nonvf.pdf
> – "Algorithmic information is at the root of all our problems" [Warwick Postgraduate colloquium (Mar 2023)]: abhimanyu.io/legacy_writing/PhD_presentations/algorithmic_info.pdf
> – "Incompleteness theorems and firing philosophers" [Warwick Cake Talk (Feb 2023)]: abhimanyu.io/legacy_writing/PhD_presentations/incompleteness.pdf
> – "A mathematical definition of property rights" [Imperial Undergraduate Colloquium (Feb

2022), Sheffield SIAM-IMA Applied Math Conference (Jul 2021)]:
abhimanyu.io/legacy_writing/Imperial_presentations/property_rights.pdf

**AI Debate (2024)**

Ongoing collaboration with a team supervised by Arjun Panickssery and Nina Rimsky, on training AI debaters for various natural language tasks.

**Consistency checks and forecasting (2024)**

Ongoing collaboration with an ETH Zurich team supervised by Daniel Paleka to develop a consistency benchmark for LLM forecasters.

- Abhimanyu Pallavi Sudhir, Alejandro Alvarez, Adam Shen, and Daniel Paleka (2024), "Consistency Checks for Language Model Forecasters" *Workshop paper, accepted to:* Agentic Markets Workshop at ICML 2024; NextGenAISafety Workshop at ICML 2024; Oxford ELLIS Robust LLMs Workshop 2024

**General mathematics (Undergraduate work and prior)**

- Abhimanyu Pallavi Sudhir (2019), "Infinitesimal translations and a multivariate Grünwald-Letnikov calculus", arxiv.org/abs/1904.02710
- Abhimanyu Pallavi Sudhir (2018), "The generalized Cauchy derivative as a principal value of the Grünwald-Letnikov fractional derivative for divergent expansions," arxiv.org/abs/1809.08051
- Abhimanyu Pallavi Sudhir (2019), "Generalisations of the determinant to interdimensional transformations: a review," arxiv.org/abs/1904.08097
- ~~Abhimanyu Pallavi Sudhir (2014), "On the Determinant-like function and the Vector Determinant," *Advances in Applied Clifford Algebras* (24-3: 805-807), doi:10.1007/s00006-014-0455-3~~
- ~~Abhimanyu Pallavi Sudhir (2014), "On the Properties of the Determinant-like function," (presented at International Conferences on Mathematical Sciences, Chennai, July 17-19, 2014).~~
- ~~Abhimanyu Pallavi Sudhir (2013), "Defining the Determinant-like function for m by n matrices using the exterior algebra," *Advances in Applied Clifford Algebras* (23-4: 787-792), doi:10.1007/s00006-013-0416-2~~
- ~~Abhimanyu Pallavi Sudhir (2012), "The Representation of Matrices in unit vector notation," *Journal of Mathematics Research* (4-4: 86-91), doi:10.5539/jmr.v4n4p86~~
- ~~All of the crank stuff I posted to PhysicsForums as a kid~~

*Related write-ups and talks.*

— Fractional calculus presentation [IMA Tomorrow's Mathematicians Today (Feb 2019), Imperial Undergraduate Colloquium (Nov 2018)]:
abhimanyu.io/legacy_writing/Imperial_presentations/fractional_calculus.pdf

— Intel ISEF (May 2015) [received AMS Karl Menger Award]

## Academic service

- *Reviewer for NextGenAISafety Workshop at ICML 2024* · 2024
- *Teaching Assistant for CS141: Functional Programming (Warwick)* · 2023
- *Reviewer for Advances in Applied Clifford Algebras (Springer)* · 2020-present

## Workshops and courses

- *Co-operative AI Foundation* · Jul 2023 · workshop on AI and cooperative game theory
- *Machine Learning and Applied Statistics* · Jul 2019 · summer course at Imperial College Business School; 7.5 ECTS, score: 97.5%

## Other projects

### Equivariant learning (2021-22)

Final-year MSci project with Professor Jeroen Lamb at Imperial College London exploring equivariant learning and causal DAGs.

Report: abhimanyu.io/legacy_writing/Imperial_reports/m4r.pdf

### Local normal forms of analytical maps near fixed points (2020)

Second-year MSci project with Professor Davoud Cheraghi at Imperial College London.

Report: abhimanyu.io/legacy_writing/Imperial_reports/m2r.pdf
Presentation: abhimanyu.io/legacy_writing/Imperial_reports/m2r_presentation.pdf

### Lie theory (2019)

Undergraduate research project with Professor Richard Thomas at Imperial College London on Lie groups and algebras.

Report: abhimanyu.io/legacy_writing/Imperial_reports/urop.pdf
Presentation: abhimanyu.io/legacy_writing/Imperial_presentations/lie_theory.pdf

> *Related write-ups and talks.*
>
> — Warwick-Imperial Autumn Meeting (Mar 2022) [cancelled due to COVID-19 lockdowns]
> — Imperial Undergraduate Colloquium (Oct 2019)
> — Imperial 3-minute thesis competition (Oct 2019)

### Lean (2018-19)

Computerized formal proving in Lean with Professor Kevin Buzzard at Imperial College London.

- Wrote the FilterProduct.lean and Hyperreal.lean modules for the Lean math library
- Imperial first-year project poster: abhimanyu.io/legacy_writing/Imperial_reports/m1r.pdf
- Formalized the first-year "Foundations of Analysis" module exam Blog post: xenaproject.wordpress.com/2019/05/06/m1f-imperial-undergraduates-and-lean/

### PhysicsOverflow (2014-15)

Co-founded PhysicsOverflow, a postgraduate-level physics Q&A site and open peer review system. See en.wikipedia.org/wiki/PhysicsOverflow for more details.

- Abhimanyu Pallavi Sudhir and Rahel Knoepfel (2015), "PhysicsOverflow: A postgraduate-level physics Q&A site and open peer review system," *Asia-Pacific Physics Newsletter* (4-1: 53-55), doi:10.1142/S2251158X15000193

### ~~The Mathematics and Physics Encyclopedia (2010-14)~~

- ~~psiepsilon.wikia.com~~
- ~~psiepsilon.wordpress.com~~
- ~~youtube.com/user/abhi99ps~~

**Awards**

- Scholarships
  - Warwick PhD (2022-26) – departmental full scholarship
  - ICBS Machine Learning Summer course (2019) – departmental full scholarship
- Conferences and science fairs
  - IMA TMT, London (2019) – among 4 shortlisted for GCHQ prize
  - Intel ISEF, Pittsburgh (2015) – AMS Karl Menger Award
  - ~~International Conference on Mathematical Sciences 2014 – Best Paper Award~~
  - IRIS National Science Fair (2014) – Gold; Amul Top 3; GUJCOST Merit Award
  - IRIS National Science Fair (2013) – Silver; Special Physics Prize
- Problem-solving and olympiads
  - Imperial Mathematics Competition (2019) – nationwide finalist
  - IIT Math Olympiad (2017) – sixth place nationally in India
  - Regional Mathematical Olympiad (2016) – Merit
- Kid competitions
  - 2012 Bukit Panjang High School Mathematics and Science Challenge – Team 1st
  - 2012 American Mathematics Contest – Certificate of Achievement
  - 2012 Rio Tinto Science Contest – High Dist
  - 2011 Singapore Mathematical Olympiad Junior – Honorable Mention
  - 2011 Singapore Mathematical Olympiad for Primary Schools – Gold
  - 2011 Singapore and ASEAN Schools' Math Olympiad – Gold
  - 2011 Anglo-Chinese Young Whizzes' Challenge – Gold; Team Round – Team 2nd
  - 2011 River Valley Math Comp – Individual 1st; Team 1st; Team round – 2nd; Platinum
  - 2011 St. Andrew's Math and Science Comp – Individual 1st; Team 1st; Team round – 1st
  - 2011 Mathematical Olympiad Talent Quest – Bronze; Team Round – Team 3rd
  - 2011 Australian Mathematics Competition – High Dist
  - 2011 Rio Tinto Science Contest – Credit
  - 2011 UNSW ICAS – Math/Sci/English (Dist) Computers (Credit)
  - 2010 NUSHS Singapore Primary Science Olympiad – Gold
  - 2010 NUSHS National Math Olympiad of Singapore – Bronze
  - 2010 Anglo-Chinese Mathlympics – Individual 3rd; Gold
  - 2010 Anglo-Chinese Young Whizzes' Challenge – Gold
  - 2010 Singapore and ASEAN Schools' Math Olympiad – Gold
  - 2010 Australian Mathematics Competition – Dist
  - 2010 UNSW ICAS – Math (HighDist) Science (Dist) English/Writing/Computers (Credit)
  - 2009 UNSW ICAS – Math (HighDist) Science (Dist) English (Credit)
  - 2009 Australian Mathematics Competition (Dist)

– 2008 UNSW ICAS – Math/Science/English (Dist)
– 2008 Australian Mathematics Competition (Credit)

## Links


- Email: abhimanyupallavisudhir@gmail.com
- Contact: +44-7771824896
- Website: abhimanyu.io
- Blog: TheWindingNumber.blogspot.com
- Google Scholar: scholar.google.com/citations?user=lb38BjYAAAAJ
- Github: github.com/abhimanyupallavisudhir
- LessWrong: lesswrong.com/users/abhimanyu-pallavi-sudhir
- StackExchange: math.stackexchange.com/users/78451/abhimanyu-pallavi-sudhir
- PhysicsOverflow: physicsoverflow.org/user/dimension10


**Key:** Regular, Archived, ~~Disowned~~