

Arpan Dey*

*CV last updated in January 2024

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Summary

Arpan Dey, 19, is an undergraduate physics student and science writer based in India. He is mainly interested in physics (particularly in quantum mechanics, quantum gravity, chaos theory, cosmology, aerodynamics, complexity, emergence, consciousness etc.). He has written and edited many science articles (original research as well as review) for different journals and magazines. He has published a popular science book on physics, titled *Our Physics So Far: A Journey through Spacetime, Consciousness and the Fundamental Nature of Reality*, which is available for purchase internationally. He founded a physics blogging site, *The Journal of Young Physicists*, where students can submit their physics articles for review and publication.

Experience

Senior Physics Editor, Young Scientists Journal

Jul 2020 - Present

As senior physics editor, I review and manage all physics articles – research and review – that are submitted to the YSJ, as well as coordinate the junior physics editors. Before my appointment as a senior physics editor, I worked as a junior editor of physics, mathematics and astrophysics for the YSJ. I also briefly served as a curriculum developer for YSJ's *reSTEM* project, which is an initiative to set up an international network of research clubs and introduce high-school students to research.

Member, American Physical Society

Jun 2023 - Present

I am an undergraduate student member of the APS, which allows me to connect with physicists from all over the world, take part in and contribute to physics projects and attend interesting and important webinars on the most pressing topics in physics today.

Founder and Contributor, The Journal of Young Physicists

Jul 2020 - Present

I founded a free physics blogging site for young physics aspirants to get their physics articles reviewed and published. The JYP is committed to popularizing physics and fostering the growth of young physicists.

Author, Notion Press

Jul 2021 – Present

I have published two books with Notion Press: a popular science book on physics (*Our Physics So Far*) and a Sherlock Holmes adventure along with a short story (*The Adventure Of The Injured Cabman: And A Short Story*).

Citizen Scientist, NASA - National Aeronautics and Space Administration

Jun 2023 - Present

I have worked on NASA's *Dark Energy Explorers* project and *Are We Alone In The Universe?* citizen science projects.

Virtual SOAR Scholar, Emory University Laney Graduate School

Jun 2023 - Aug 2023

I was selected to Emory University's 2023 LGS-SOAR (*Laney Graduate School – Summer Opportunity of Academic Research*) program, and was recognized by the university upon successful completion of the program.

Young Member of The Junior Academy, The New York Academy of Sciences

Sep 2020 - Jul 2022

The *Junior Academy* is a STEM program for high-school students, where students from all over the world are put in small groups and given the chance to solve real-life, challenging STEM problems.

Education

St. Xavier's College (Autonomous), Kolkata

Undergraduate student, Physics (with Mathematics and Computer Science)

Sep 2022 – Present

Delhi Public School, Burdwan

Senior secondary high-school graduate, Science (Physics, Chemistry and Mathematics)

2008 – 2022

Selected Publications

A Study on Improving Take-Off Efficiency of Airplanes

DOI: 10.5281/ZENODO.8284591

<https://zenodo.org/records/8284591>

This article explores the pros and cons of a movable forward-set split-flap-like structure in the main wing of an airplane, and its effectiveness in improving take-off efficiency and maneuvering capabilities of airplanes.

Can the de Broglie Relation be Modified for Accommodating Relativistic Modifications in the Schrodinger Equation?

DOI: 10.5281/ZENODO.8284632

<https://zenodo.org/records/8284632>

This is a study on using the mass-energy-momentum relation to derive de Broglie's equation, and in turn, Schrodinger's time-independent equation.

Investigations on Isotopic Elements in Terms of Quarks

DOI: 10.5281/ZENODO.8284563

<https://zenodo.org/records/8284563>

This is a research article which establishes certain relations, in terms of atomic number, number of up/down quarks in the nucleus (etc.), regarding isotopic elements.

Geometry, Symmetries, and Quantization of Scalar Fields in de-Sitter Spacetime

Coauthors: Riddhiman Bhattacharya, Sanchari Sen

DOI: 10.5281/zenodo.8392574

<https://zenodo.org/records/8392574>

The paper commences by examining the geometric properties of de-Sitter spacetime, with a specific focus on the isometries generated by killing vectors. It also investigates various metrics that are applicable to specific regions of spacetime, revealing that in the distant future, the symmetries exhibit a similar local structure to that of R3. Furthermore, the classical Klein-Gordon equation is solved within this space-time, leading to the discovery that energy is not conserved. The solutions to the Klein-Gordon equation yield intriguing outcomes that have the potential to enable observations from the early

inflationary era. Finally, the primary objective of the paper is to comprehensively examine a quantized scalar field in the de-Sitter background, exploring the solutions for the two-point function and analyzing their behavior during both early and late time periods.

Emergence and Consciousness

Coauthor: Sanchari Sen

DOI: 10.5281/zenodo.8391483

journalofyoungphysicists.org/post/emergence-and-consciousness-review

This article discusses weak and strong emergence, and the emergent nature of consciousness. This paper was presented by the authors at their college (St. Xavier's College, Kolkata) in *Spectrum 2023*, the annual fest of the college's physics department. The paper won the second prize in the paper presentation event.

On the Black Hole Information Paradox

Coauthor: Sanchari Sen

journalofyoungphysicists.org/post/on-the-black-hole-information-paradox

A review article on the black hole information paradox, its significance and possible solutions.

Our Physics So Far: A Journey through Spacetime, Consciousness and the Fundamental Nature of Reality

ASIN: B0BD8MC5NW

<https://www.amazon.com/dp/b0bd8mc5nw>

Our Physics So Far – Arpan's debut book – is a popular science book on physics which narrates the journey of physics and science from Newton's days to the present, with interesting discussions on consciousness, chaos theory, deductions, paradoxes and an interview with renowned physicist Edward Witten. The book starts with a discussion on cosmology, then moves on to the development of mathematics and classical physics. Then, the special and the general theories of relativity are discussed. The next part is about the evolution and interpretations of quantum mechanics. The next part discusses modern particle physics, the information paradox and the hunt for a theory of everything. Then, the book turns to the physics of complexity and chaos theory, following which the question of the nature of consciousness is addressed, with some brief discussion of neuroscience and psychology. Finally, there is a discussion on metaphysics, paradoxes and the fundamental nature of reality. The book has mostly received positive feedback from readers around the world.

Properties and Biomedical Applications of Graphene-based Nanotechnologies (Book chapter)

Book title: *Nanotherapeutic Strategies and New Pharmaceuticals (Part 1)*

Publisher: *Bentham Books*

Coauthors: Fabeha Shafaat, Roberto Parisi, Nipun Gorantla, Fahad Hassan Shah

Part of DOI: 10.2174/97898150366941210101

<https://benthambooks.com/book/9789815036694/>

A comprehensive discussion on the most exciting topics in physics with Arpan Dey

<https://www.journalofyoungphysicists.org/post/a-comprehensive-discussion-on-the-most-exciting-topics-in-physics-with-arpan-dey>

In this article, Arpan answers some of the most exciting and frequently-asked questions in physics, ranging from questions on cosmology and classical physics to quantum mechanics, quantum gravity and complexity, in an engaging yet rigorous manner.

General relativity: A Simple Discussion

<https://www.journalofyoungphysicists.org/post/general-relativity-a-simple-discussion-review>

An article which discusses the basic idea behind Einstein's general theory of relativity, written for the general audience.

A Discussion on the Theory of Everything

Horizon 2023 (Page - 59)

<https://drive.google.com/file/d/1TyKizVVUIZfxyoS0xtUroXMqB7dosQRX/view>

This article, written for the annual magazine of the physics department of St. Xavier's College, Kolkata, discusses our quest for a unified theory of the universe.

The Journey of Physics So Far

Coauthors: Sonnet Xu

<https://ysjournal.com/physics/the-journey-of-physics-so-far/>

An article which touches upon all important and recent developments in physics and discusses the history of physics as well as the direction that future research in physics might take.

Chaos Theory and Consciousness

<https://ysjournal.com/mathematics/chaos-theory-and-consciousness/>

An article which introduces the concepts of chaos theory and fractal geometry, discusses their diverse applications as well as discusses the potential link between consciousness and chaos.

Licenses and Certifications

Summer Opportunity for Academic Research – Laney Graduate School

Emory University

<https://drive.google.com/file/d/1FjobvYBJ-EL0oBn30OXWu36sWd6byznP/view>

Perception Census

Dreamachine

https://drive.google.com/file/d/1mxtaxUuYzC_KWOTRR4aWTxRAHRGyu5YL/view?usp=sharing

Top 100 Innovators – Student Innovation Challenge 2020

Smartcircuits Innovation Pvt. Ltd.

<https://drive.google.com/file/d/1YvspMZ96eQ65Thf8x-zpnJ4Ykls6vTq7/view>

Particle Physics: an Introduction – University of Geneva

Coursera

<https://www.coursera.org/account/accomplishments/certificate/KUFWDBP8AUYY>

Emergent Phenomena in Science and Everyday Life – University of California, Irvine

Coursera

<https://www.coursera.org/account/accomplishments/certificate/WWY2FURR4KUS>

Young Member of the New York Academy of Sciences

The New York Academy of Sciences

<https://www.youracclaim.com/badges/cc3a3d4a-6164-4baf-b5dd-09cee1cb8ac1>

Introduction to Philosophy – The University of Edinburgh

Coursera

<https://www.coursera.org/account/accomplishments/certificate/85CN5FMVU8RK>

Understanding Modern Physics I: Relativity and Cosmology – The Hong Kong University of Science and Technology

Coursera

<https://www.coursera.org/account/accomplishments/certificate/VDDYH2WPG37N>

Understanding Modern Physics II: Quantum Mechanics and Atoms – The Hong Kong University of Science and Technology

Coursera

<https://www.coursera.org/account/accomplishments/certificate/A5MW98UAAZC5>

Understanding Modern Physics III: Simplicity and Complexity – The Hong Kong University of Science and Technology

Coursera

<https://www.coursera.org/account/accomplishments/certificate/LWTTR5323LDJ>