

Archisman Panigrahi

3rd year Undergraduate · Physics Major
Indian Institute of Science, Bangalore, India
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Education

B.S. (Research) in Physics

INDIAN INSTITUTE OF SCIENCE

- Current C.G.P.A - 9.7/10

Bangalore, India

Aug. 2017 - Apr. 2021 (expected)

Higher Secondary Examination (XII^{th} standard)

HOOGHLY COLLEGIATE SCHOOL

- Obtained 1st rank in Board

West Bengal Council of Higher
Secondary Education, India

2015 - 2017

Secondary Examination (X^{th} standard)

HOOGHLY COLLEGIATE SCHOOL

- Obtained 2nd rank in Board

West Bengal Board of Secondary
Education, India

2005 - 2015

Skills

Strong in Topics	Classical Electromagnetism, Statistical Mechanics, Quantum Mechanics, Classical Thermodynamics
Mathematical skills	Integral Calculus, Linear Algebra, Trigonometry Able to perform long algebraic calculations
Softwares	Familiar with MATLAB/Octave, Mathematica, Microsoft Excel
Computer languages	Familiar with basic data structures and numerical computation in C
Languages	Fluent in English, Bengali, Hindi

Projects

Nano Heat Engines

WITH PROF. H. R. KRISHNAMURTHY

IISc, Bangalore

May 2019 - July 2019

- Studied how harmonic oscillators, two state systems can be used as efficient heat engines
- Read Articles claiming they surpassed Carnot efficiency with “squeezing”, and figured out the sense in which Carnot efficiency is surpassed
- Studied how one can produce such a squeezed state of a harmonic oscillator using “squeezed thermal bath”
- Studied about Brownian Motion and Langevin equation
- Solved the Langevin equation for a special kind of random force, for which a classical harmonic oscillator behaves like a squeezed state

Various topics on the Special Theory of Relativity

WITH PROF. SUBROTO MUKERJEE

IISc, Bangalore

May 2018 - June 2018

- Studied basics of Special theory of relativity - four vector notation, Lorentz transformations, relativistic momentum and energy
- Studied how electric and magnetic field behave under change of reference frames
- Worked out a detailed example of how a signal travelling faster than light can violate causality (see *Articles* section below)
- Studied relativistic Doppler effect of an electromagnetic wave travelling in a medium

Relevant Courses Taken

Textbooks are given in brackets to indicate the level of the course

SEMESTER I

- **Introductory Physics I – Mechanics, Oscillations and Waves** (An Introduction to Mechanics - **Kleppner & Kolenkow**)
- **Analysis and Linear Algebra I** (Calculus, Volume I - **Apostol**; Linear Algebra and its Applications - **Strang**)
- **Algorithms and Programming (in C)**

SEMESTER II

- **Introductory Physics II – Electricity, Magnetism and Optics** (Introduction to Electrodynamics by **David J. Griffiths**)
- **Analysis and Linear Algebra II** (Calculus, Volume II - **Apostol**; Linear Algebra and its Applications - **Strang**)
- **Introduction to Electrical and Electronics Engineering**

SEMESTER III

- **Introductory Physics III - Thermal and Modern Physics** (Thermodynamics - **Enrico Fermi**; Fundamentals of Physics - **Halliday, Resnick and Walker**; PHYSICS For Scientists and Engineers - **Serway & Jewett**)
- **Probability and Statistics** (An Introduction to Probability Theory and its Applications - Vol. I - **Feller**; Introduction to Probability and Statistics for Scientists and Engineers)
- **Introduction to Materials Science (Semester 3)**

SEMESTER IV

- **Intermediate Mechanics, Oscillations and Waves** (The **Feynman** Lectures, Vol I,II;)
- **Intermediate Electromagnetism and the Quantum Physics of Radiation** (The **Feynman** Lectures, Vol I,II; Introduction to Electrodynamics by **David J. Griffiths**)
- **Intermediate Thermal Physics and the Physics of Materials** (Thermodynamics and Introduction to Thermostatistics - **Callen**; Fundamentals of Statistical and Thermal Physics - **F. Reif**)
- **Numerical methods for solving differential equations**

SEMESTER V

- **Classical Mechanics** (Classical Mechanics - **Goldstein**; Mechanics **Landau and Lifshitz**)
- **Quantum Mechanics I** (Quantum Mechanics - **Cohen-Tannoudji, Diu and Laloe**; Principles of Quantum Mechanics - **Shankar**)
- **Mathematical Methods of Physics** (Mathematics for Physicists - **Dennery and Krzywicki**; Mathematical Methods for Physicists - **Arfken, Weber and Harris**)
- **Fundamentals of Astrophysics** (Astrophysics for Physicists - **Rai Choudhuri**; Astrophysics in a Nutshell - **Maoz**)
- **Solid State Physics** (The Oxford Solid State Basics - **Simon**, Solid State Physics - **Ashcroft & Mermin**)

Topics of Interest

- Theoretical Condensed Matter Physics
- Nano Heat Engines
- Brownian Motion
- Applications of Statistical Mechanics in classical and quantum systems
- Photonics

Achievements

2017-19	C.G.P.A 9.7/10	<i>IISc, Bangalore</i>
2017	I rank (99.2 %) in Board in Higher Secondary Examination	<i>West Bengal, India</i>
2017	10th Rank in National Entrance Screening Test (NEST)	<i>India</i>
2017	Qualified for JEE Mains (All India Rank - 381) - an all India Engineering entrance	
2017	Qualified for JEE Advanced examination (All India Rank- 543), Entrance examination of Indian Institutes of Technology (IIT)	
2017	Qualified for Indian Statistical Institute, Kolkata and Chennai Mathematical Institute	
2015	Qualified for K.V.P.Y (All India Rank - 128)	
2015	II rank (97.57 %) in Board in Secondary Examination	<i>West Bengal, India</i>

Articles

THESE ARE SOME ARTICLES I HAVE WRITTEN (NOT PUBLISHED ANYWHERE, CLICK ON THE TITLE TO DOWNLOAD)

- Review article - A detailed example of how causality is violated when information travels faster than speed of light in vacuum (2018)
- Review article - Doppler effect of electromagnetic waves in refractive medium (2018)
- A Geometric Method to obtain Harmonic Mean of Two numbers (2016)

References

- Prof. **Hulikal Ramaiengar Krishnamurthy**, Dept. of Physics, Indian Institute of Science, Bangalore.
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