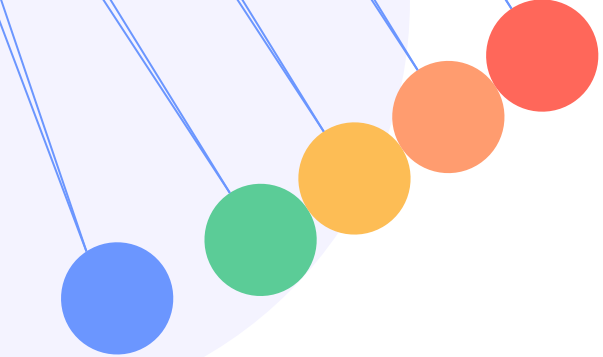
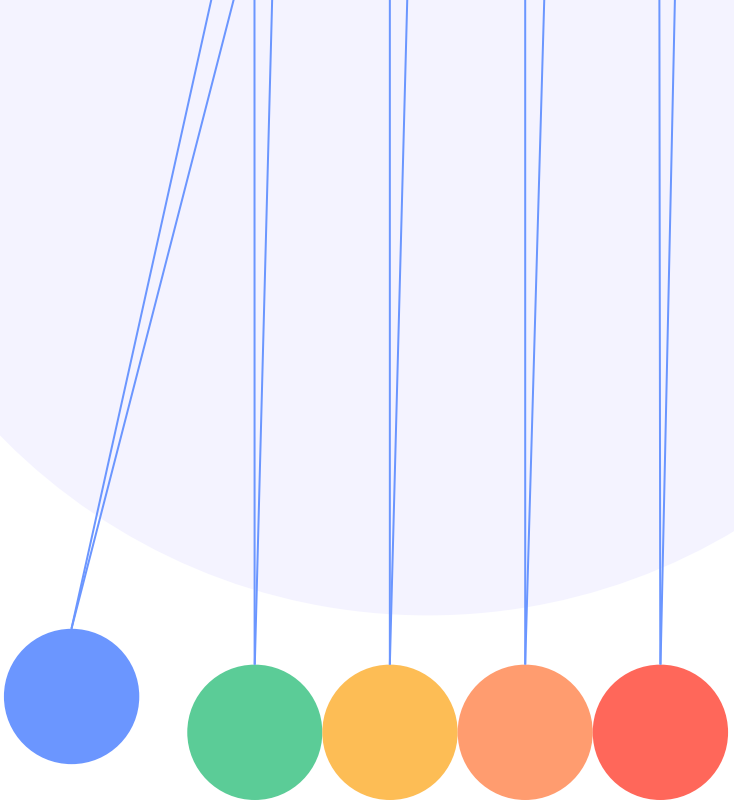
Physics Academic Expo 2023





ASHOKA UNIVERSITY

Course Structure and Overview

Offerings from the Department of Physics

Physics

- Major
- Minor
- Concentration

Astronomy

- Minor
- Concentration

General Credit Structure of the Program

	Three year B.Sc (Hons.)	Four year B.Sc (Hons.)	Four year B.Sc (Hons. with Research)
Major	60	80	80
Minor (optional)	24	24	24
Foundation Courses	36	36	36
Research	None	None	12
All academic credits (compulsory)	96	116	128
All academic credits (with minor)	120	140	152
Co-curricular courses	4	4	4
Internship	2	2	2
All non-academic credits	6	6	6
Total credits (compulsory)	102	122	134
Total credits (with minor)	126	146	158
Minimimum Number of Academic Credits to Graduate	108	144	144

General Overview of Physics Major

3 - year

- 2 Gateway courses
- 11 core courses
- 2 electives

4 - year

- 2 Gateway courses
- 11 core courses
- 7 electives

Gateway Courses

• Mathematical Physics 1:Mathematical and Computational Toolkit	1	Spring
• Lab 1: Introduction to Physics through Experiments	1	Spring

Core Courses

• Classical Mechanics	2	Monsoon
• Electricity and Magnetism in Light of Relativity	2	Monsoon
• Lab 2: Classical Mechanics and Electromagnetism	2	Monsoon
• Mathematical Physics 2	2	Spring
• Oscillations, Waves and Optics	2	Spring
• Thermal Physics	2	Spring
• Lab 3: Optics, Oscillations and Thermodynamics	2	Spring
• Quantum Mechanics	3	Monsoon
• Statistical Mechanics	3	Monsoon
• Lab 4: Quantum Mechanics and Statistical Mechanics	3	Monsoon
• Physics of Matter	3	Spring

Electives

• Computational Physics	3	Monsoon
• Mathematical Physics 3	3 / 4	Spring
• Quantum Mechanics 2	3 / 4	Spring
• Introduction to Electronics	3 / 4	Spring
• Advanced Lab 5: Experimental Soft Matter Physics/ Complex systems	3 / 4	Spring
• The Special Theory of Relativity	3 / 4	Spring
• Symmetry in Physics	4	Spring
• Non-equilibrium Statistical Mechanics	4	Spring
• Soft Matter Physics	4	Monsoon
• Graduate Lab	4	Monsoon

Cross Listed Electives

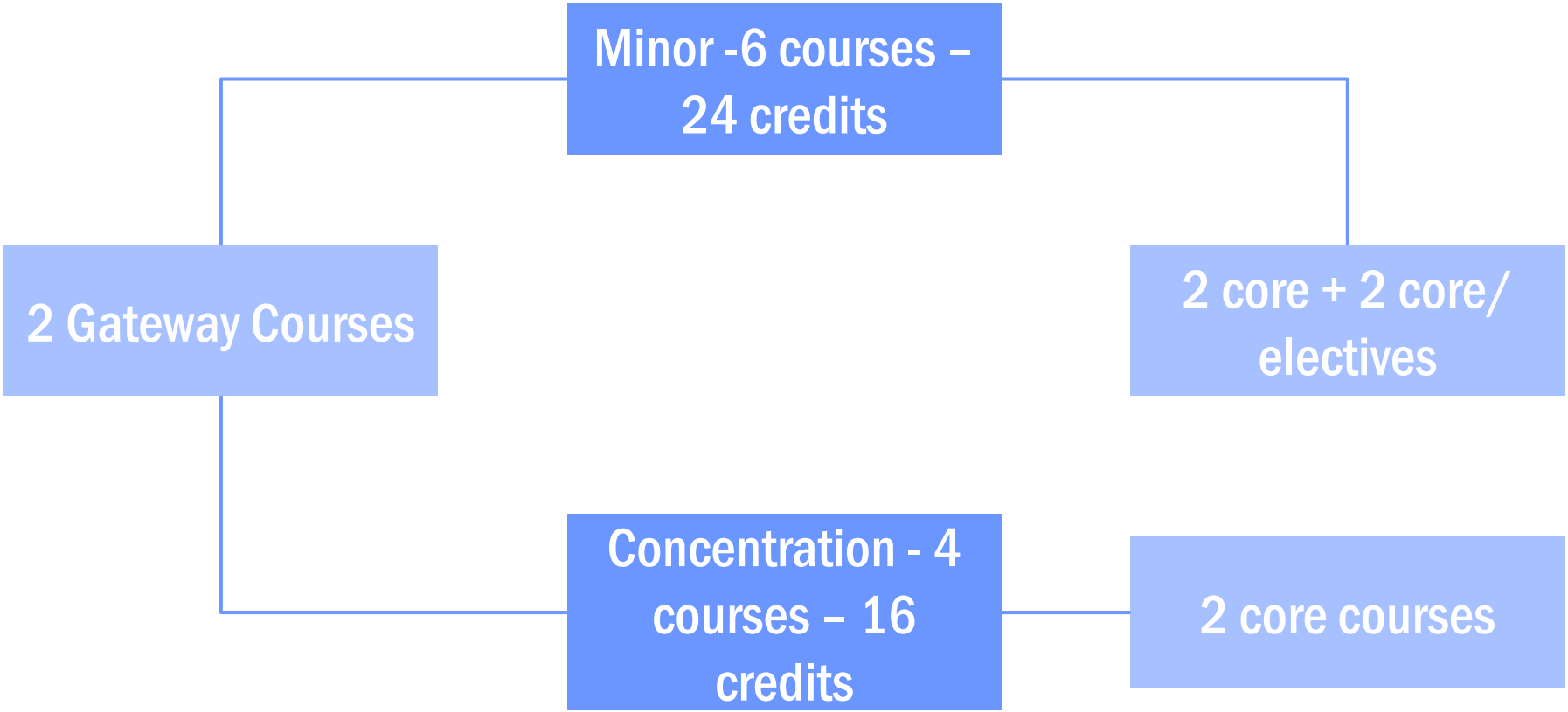
[BIO] Ecology	3	Spring
[BIO] Force and Motion in Biology	4	Spring
[BIO] Computational Biology	3	Monsoon

Recommended Courses

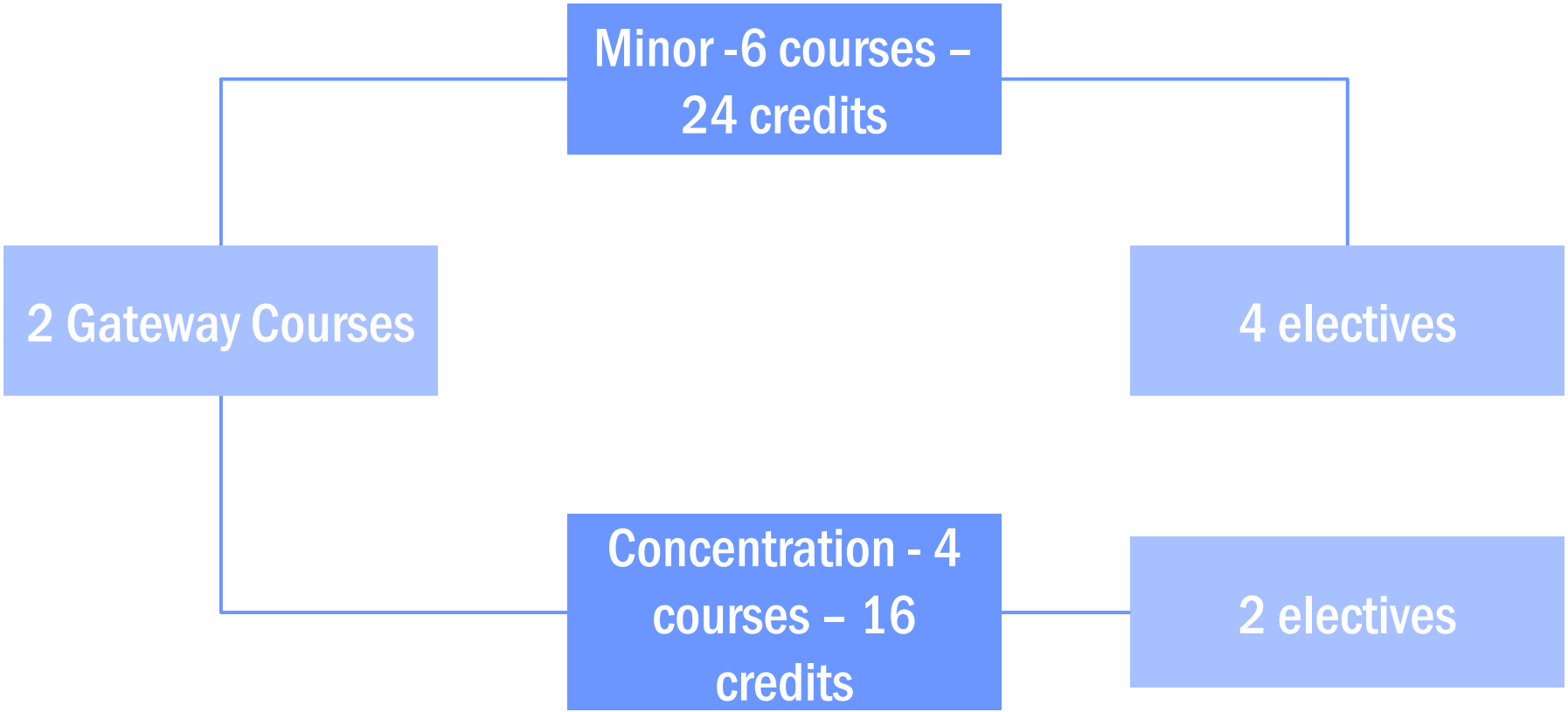
[MAT] Calculus	1	Spring/Monsoon
[MAT] Linear Algebra	1	Spring/Monsoon
[MAT] Probability and Statistics	2	Monsoon
[CS] Introduction to Programming	1	Spring/Monsoon
[CS] Introduction to Machine Learning	1	Spring/Monsoon
[CHM] Group Theory and Quantum Mechanics	4	Spring

Independent Study Modules

Physics Minor and Concentration



Astronomy Minor and Concentration



Gateway Courses

• Observing the Cosmos	1	Spring
• Physics of the Universe	2	Monsoon

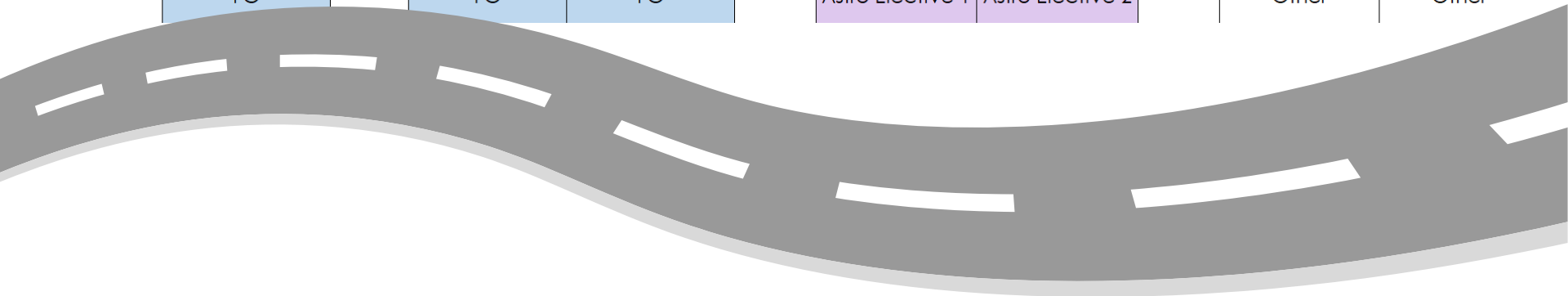
Electives

• The Earth and the Other Planets	2 / 3	Monsoon
• Cosmic Messengers 1 (Theory)	3 / 4	Spring
• Cosmic Messengers 2 (Lab)	3 / 4	Monsoon
• The Violent Universe	3	Spring
• Astrophysical and Geophysical Fluid Dynamics	4	Spring
• Computational Astrophysics and Geophysics	4	Monsoon
• Introduction to General Relativity with Cosmology	4	Monsoon

All Astronomy Electives are Physics Electives also

Recommended Course Trajectory for Physics Major and Astronomy Minor

YEAR 1			YEAR 2			YEAR 3			YEAR 4	
MONSOON	SPRING	SUMMER	MONSOON	SPRING	SUMMER	MONSOON	SPRING	SUMMER	MONSOON	SPRING
Calculus	Mathematical Physics 1		Classical Mechanics	Mathematical Physics 2		Quantum Mechanics	The Physics of Matter		Elective 3	Elective 6
FC	Lab 1		EM + Relativity	Thermal Physics		Statistical Mechanics	FC		Elective 4	Elective 7
FC	Observing the Cosmos		Lab 2	Oscillations, Waves & Optics		Lab 4	FC		Elective 5	Other
FC	FC		Physics of the Universe	Lab 3		Elective 1	Elective 2		Astro Elective 3	Astro Elective 4
	FC		FC	FC		Astro Elective 1	Astro Elective 2		Other	Other



Department Activities

Colloquia

Held every Wednesday – 1:30 PM

Speakers from Home as well as other institutions

CONDMAT@2023

Meeting on theoretical and experimental condensed matter physics

Held on April 1 and 2, 2023 at Ashoka University – with IISER Mohali

Focus on current research with some pedagogic components

Physics Society

President: Satwik Wats; Editorial Head: Esha Sajjanhar; Outreach Head: Kasturi, Treasurer: Abeer Karandikar

Open Labs

LaTeX Workshops

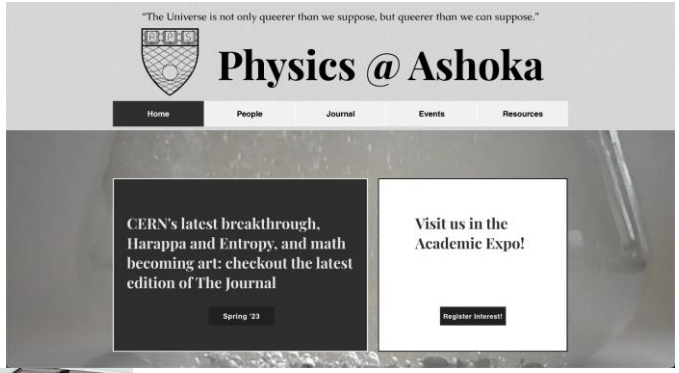
Arduino Workshops

Movie Nights

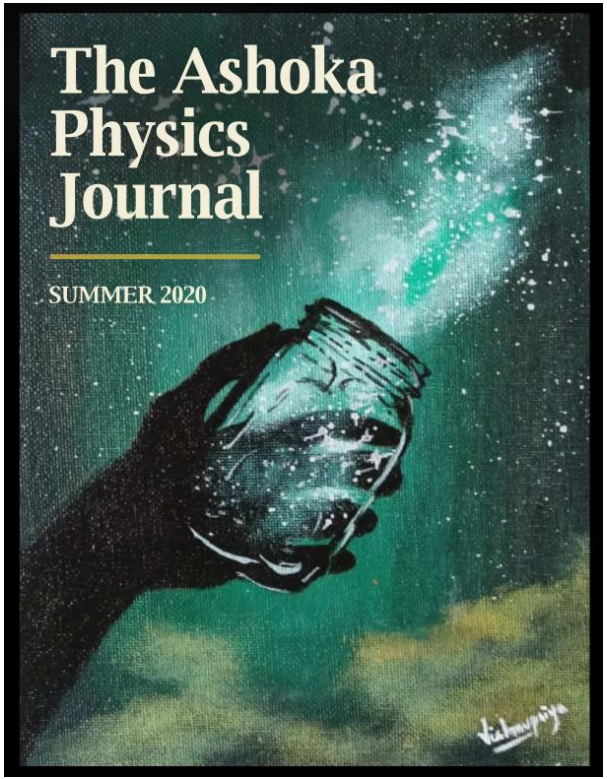
Student Talks

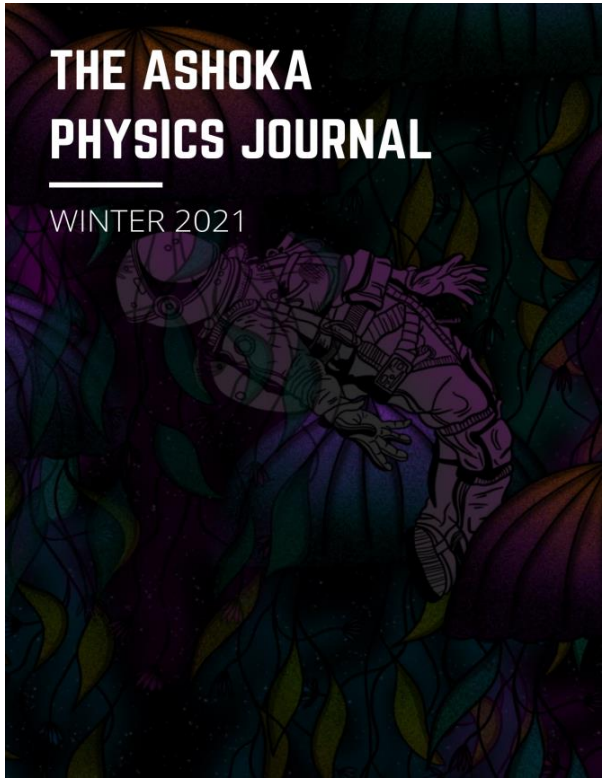
Trips

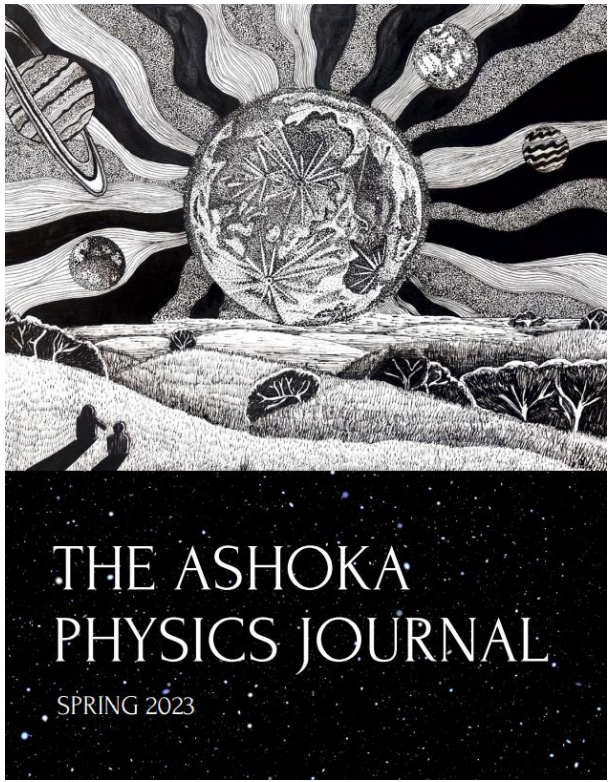
Helpdesks



Physics Society Website


The Ashoka Physics Journal
SUMMER 2020


THE ASHOKA PHYSICS JOURNAL
WINTER 2021


THE ASHOKA PHYSICS JOURNAL
SPRING 2023

Astronomy Society

President: Shwetha Prakash; Secretary: Kushal Jain

Astronomy Fest – SpaceCraft

Telescope Sessions

DIY Workshops

Movie Nights

Student Talks

Trips

Helpdesks

Telescopes:
Zoom and Zip

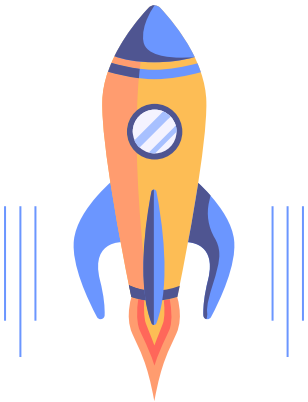
Zoom: Midnight Star 8 inch
Optical Design: Parabolic Newtonian Reflector
Diameter of aperture: 200 mm
Focal Length: 1000 mm
Focal Ratio: F/5

Zip: Celestron Nexstar 8SE
Optical Design: Schmidt Cassegrain
Aperture: 200 mm
Focal Length: 2032 mm
Focal ratio: F/10

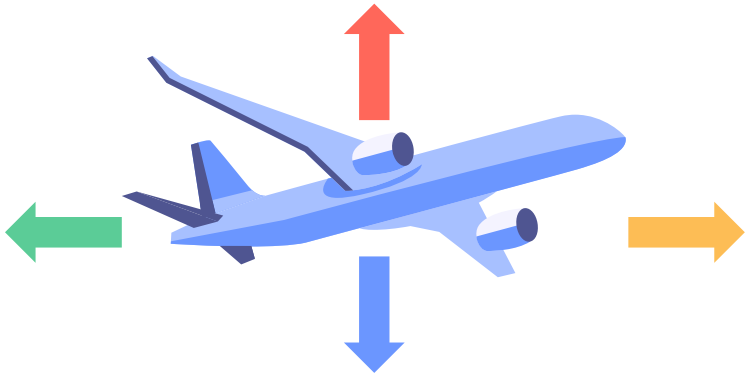
Student Projects and Internships

Summer 2018

- Decrease In Oxygen Content Due To Increase In Microplastics (Miranda House): Aditya Singh, Sreya Dey
- Modelling The Simple Pendulum For Large-angle Motion & The Sunspot Cycle (TIFR): Rashmi Gottumukkala
- Orbit Simulation: Nayanika Krishnan
- Non-linear Dynamics: Rahul Menon
- Van De Graff Generator: Anand Waghmare, Shwetabh Singh
- Ashoka Pillar Award: Anand Waghmare, Heer Shah



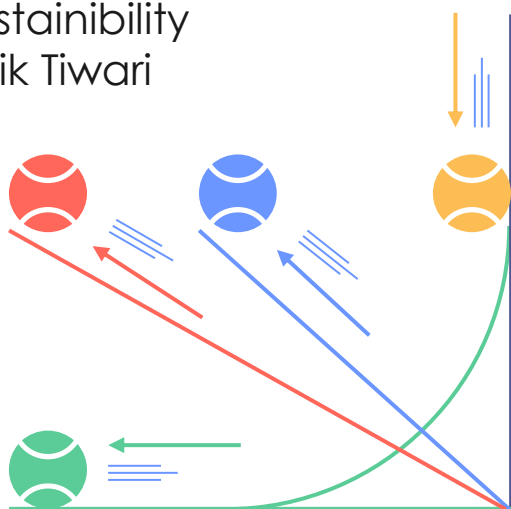
Summer 2019



- Data Science And Machine Learning: Aishwarya Das
- Content Development For Physics: Bharathi Panicker
- Random Walk Simulations: Sreya Dey, Aishwarya Jain
- Markov Chains And Hidden Markov Models: Yajushi Khurana
- Solution Sets For Study Material: Risham Parmar
- Analysis Of Rat Exploratory Behavior Using Statistical Methods: Rashmi Gottumukkala
- Program To Automate Data Analysis: Rahul Menon
- Training Program On Hmds: Shwetabh Singh
- Built A Water Quality Detector Using Arduino: Aishwarya Jain, Riya Banerjee
- Guided Study Of Synthesis Of Various Nanomaterials: Naren Varadarajan

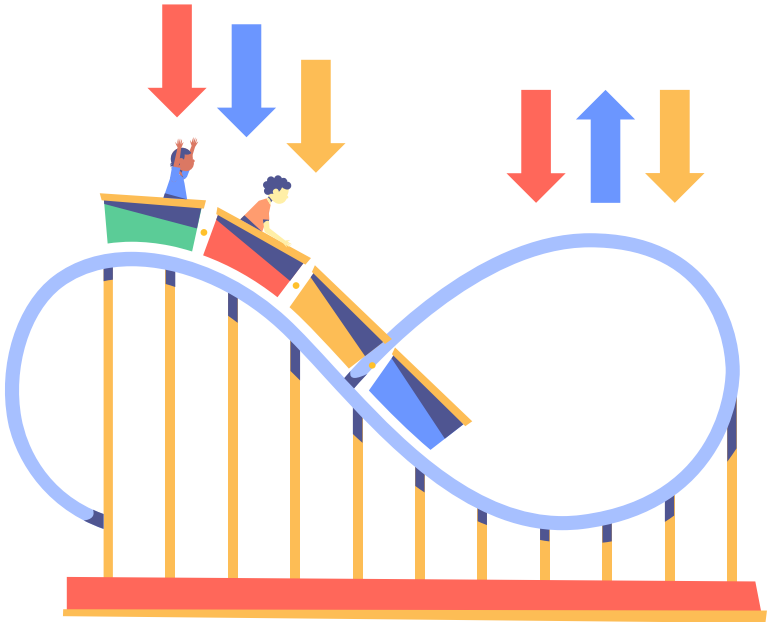
Summer 2020

- Modelling And Mitigating Multipath Error In India's Navic Satellites: Kartik Tiwari
- Simulating And Comparing Spacecraft Atmospheric Re-entry Strategies: Kartik Tiwari
- Working With International Planetarium Society's Global Sustainibility Declaration And Science Communication Guidelines: Kartik Tiwari



Summer 2021

- Measuring the Temperature of the Sun using Wien's Displacement Law: Shwetha Prakash, Kushal Jain
- Non-linear Dynamics
- Physics of Milk
- Physics of Cold Drinks: Anjali Waghmare
- Modelling the Pandemic
- Experimental Projects
- DNA Topoisomerase: Yerik Singh
- Study on Termite Mounds



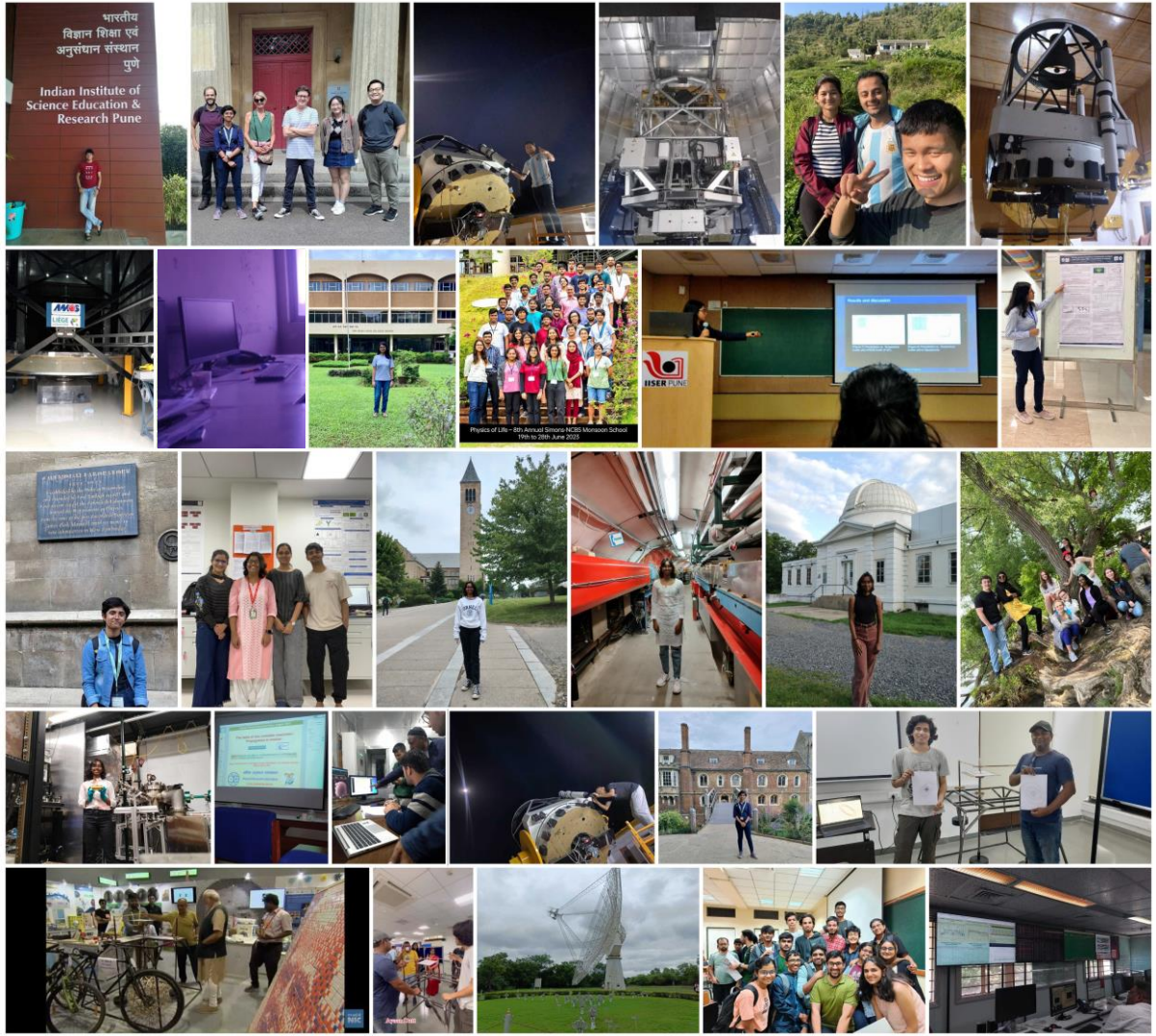
Summer 2022

- Modelling the effects of stellar oblateness on planetary orbits: Dhruv Aryan, Esha Sajjanhar
- Challenging the predictions of inflationary models with CMB data: Esha Sajjanhar
- Impact of Solar Activity on Muon Flux: A study using Quarknet Data: Satwik Wats
- National Initiative on Undergraduate Sciences – Astronomy Camp: Sanjana Gupta
- Brownian Motion - modelling the motion of a single atmospheric particle on Python: Aditya Ramdasi
- Perihelion Precession of Mercury's Orbit: Dhruv Pisharody, Abeer Karandikar
- Computationally modelling a brownian oscillator and verifying statistical results: Keerthana Sudarshan, Satwik Wats
- Determining Earth's Mass and J2-Perturbation Value using Satellite Orbital Simulation: Kushal Jain, Shwetha Prakash

Summer 2023

- Classification of organic reaction mechanism using machine learning: Yerik Singh
- Analytic Model: Exploring Neutrino Decay to Lighter Neutrinos in Dense Matter: Spandan Pandya
- Summer courses at University of Cambridge: Anjali Waghmare
- Building and Designing a Focusing Magnet: Shwetha Prakash
- Characterizing Forbush Decreases in Arctic and Antarctic Neutron Monitor Data: A Study of 151 Filtered ICME Events: Aditya Ramdasi
- Climate & Zonal Habitability of Exoplanets modeled with GCM codes: Effect of Continents & Obliquity: Sanjana Gupta
- Physics of Life Monsoon School, NCBS: Sanjana Gupta
- Computational modeling of skyrmion based logic gates: Satwik Wats
- Synthesising nanoparticles: Satwik Wats
- Understanding grey bodies and using them to identify sites of high mass star formation: Dhruv Pisharody
- Measuring Birefringence and Its Fluctuations in Crystalline Silicon: Kushal Jain

- Analysing the H1 signal in the galaxy using a horn antenna: Esha Sajjanhar, Keerthana Sudarshan
- Kode with Klossy: Sahaana Vijay
- Examining the Padé approximation method in particle physics: Sahaana Vijay
- Qiskit Global Summer School: Sahaana Vijay
- Monte Carlo Methods in Satistical Field Theories: Sahaana Vijay
- National Initiative on Undergraduate Sciences – Astronomy Camp: Hiyaa Atreya
- Stellar Photometry and Spectroscopy: Samadrita De, Hiyaa Atreya, Ayush Gurule, Tannuvi Agarwal
- Applications of Random Matrix Theory: Harshit Chhabra
- Gravity driven fluid oscillations with a drinking straw: Samadrita De
- Detecting asteroid and other transients across the zenith using data from ILMT (international liquid mirror telescope) and finding out their magnitudes: Mansi Bisht, Tenzin Namsey, Jagat Kafle
- Building harmonograph devices that demonstrate the concept of consonance and dissonance : Ayaan Dutt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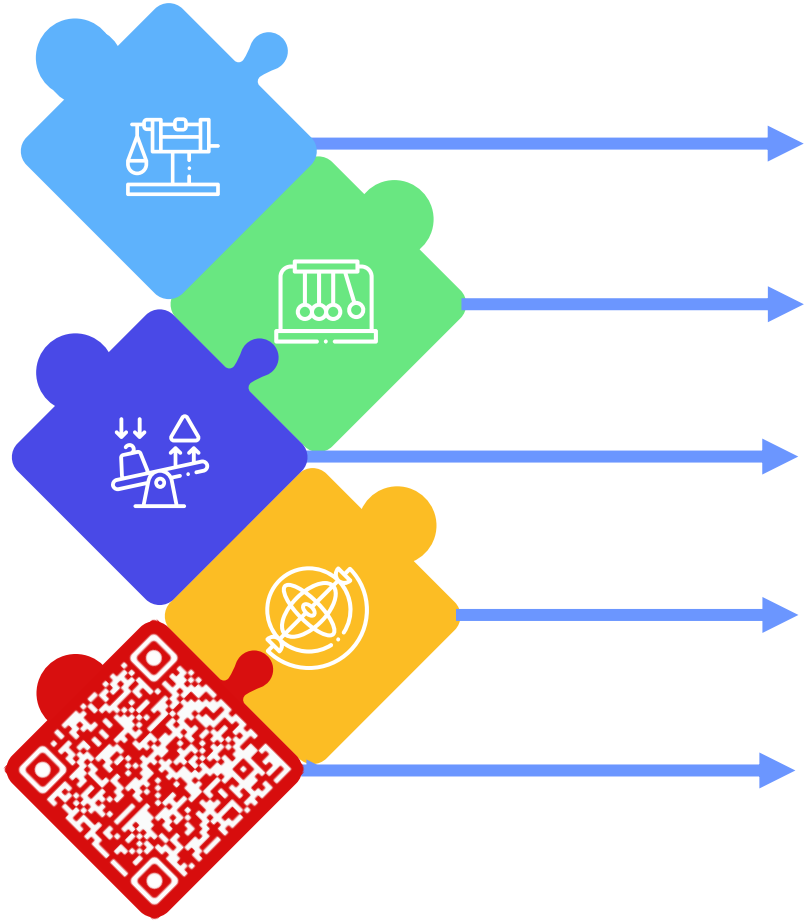
विज्ञान शिक्षा एवं
अनुसंधान संस्थान
पुणे
Indian Institute of
Science Education &
Research Pune
IISER PUNE

SUMMER 2023

Resources



Physics Department Website

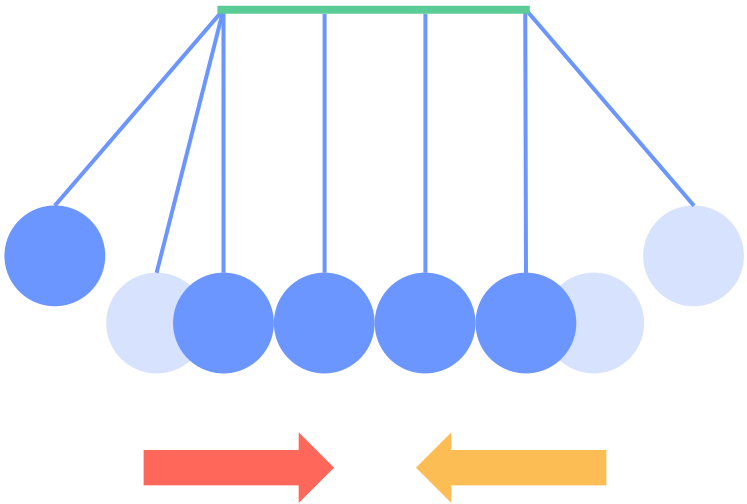
Physics WhatsApp Group

Books and other Resources

Suggestions/Complaints form

Scan to Download this PPT

Questions



For Further Questions, mail to: phys.rep@ashoka.edu.in