Announcement

National Competition in Computational Physics - 2025 (NCICP-2025)

(Physics Simulations & Software-Based Physics Experiments)

The **Annual IAPT Competition, NCICP-2025**, will be conducted **online** before the **Annual IAPT Convention 2025**. The venue and exact dates for the convention will be announced later.

Key Dates

Event	Date
Registration Deadline **(with submission of Title & One-Page Abstract)**	**31st May 2025**
Online Interaction with Experts	**15th – 21st June 2025**
Final Submission Deadline	**31st July 2025**
Final Presentation & Interaction for Evaluation (Online)	**20th – 31st August 2025**
Project Demonstration by Award Winners & Special Invitees	**During IAPT Convention 2025**

About NCICP-2025

Objectives

The **National Competition in Computational Physics (NCICP-2025)** aims to:

✅ **Promote** computational thinking, simulation-based analysis, and AI-driven problem-solving in physics.

✅ **Encourage** students and researchers to develop innovative solutions for real-world physics challenges.

✅ **Foster** deeper engagement with computational physics through hands-on simulations and software-based experiments.

✅ **Empower** educators to integrate generative AI and advanced computational teaching tools.

✅ **Enhance** modern scientific exploration by leveraging technology-driven methodologies.

This competition serves as a platform for participants to explore cutting-edge computational techniques, drive innovation, and contribute to the future of physics research and education.

Competition Categories

NCICP-2025 will have **three (03) categories**:

1 **Undergraduate (UG)**

2 **Postgraduate (PG) & Research Scholars**

3 **Educators**

- **All work presented must be original.**
- The **top three presentations in each category** will receive **prizes and certificates**.
- All participants will receive an **e-certificate**.
- **Judges' decisions will be final**.

Competition Theme

- **Innovation in Physics Experiments and Simulations**

(*Exploring new ideas, new methods, new devices, or algorithms in physics.*)

NCICP-2025 encourages **creative and innovative** approaches to **physics-based experimentation and simulations** across different academic levels.

Evaluation Criteria

Participants will be assessed based on the following metrics:

Sr. No	Criteria
1	Literature Survey
2	Software/Methodology & Implementation
3	Analysis of Results & Interpretation
4	Discussion & Critical Insights
5	Conclusions & Impact
6	Scope for Future Work
7	Bibliography & Quality of Resources
8	Novelty & Innovativeness
9	Presentation & Engagement in Interaction
10	Documentation

Competition Categories & Challenges

Category 1: Undergraduate (UG) – Foundations of Computational Physics

This Category is expected to focus on **fundamental computational skills**, **numerical methods, and digital tools** for physics problem-solving.

✔ **Computational Methods in Introductory Physics** *(Basic numerical techniques & programming applications in physics)*
✔ **Sensor-Based Data Acquisition & Analysis** *(Using Arduino/Raspberry Pi for data collection & processing)*
✔ **Simulations & Visualization in Physics** *(Graphical representations using Python, MATLAB, etc.)*

✔ **Basic AI & Data Science Applications** *(Applying AI for experimental data analysis in physics)*

Category 2: Postgraduate (PG) & Researchers – Advanced Computational Physics & AI

This Category is expected to focus on **general-purpose and advanced simulations, AI-driven applications, and quantum computing techniques** to solve complex physics problems.

✔ **Advanced Computational Techniques in Physics** *(Solving real-world physics problems with computational methods)*
✔ **Quantum Computing for Physical Simulations** *(Hands-on IBM Quantum, Qiskit & quantum algorithms)*
✔ **Machine Learning for Physics-Based Predictions** *(AI for pattern recognition, simulations & optimization)*
✔ **Multiscale Modeling & Complex System Simulations** *(Addressing interdisciplinary physics challenges)*

Category 3: Educators – Computational Physics in Classroom Teaching

This competition challenges educators to develop innovative ways to integrate computational physics into classroom teaching while ensuring **accessibility for students to learn and practice at home**.

✔ Open-Source Computational Lesson Plan Challenge

Task: Create a **lesson plan** that uses **only open-source** or freely available computational tools (e.g., PhET, Python, GeoGebra, Desmos) to teach a physics concept. The plan should include **home-based activities** to allow students to practice independently.

Evaluation Criteria:

- Use of freely available computational tools
- Clarity and effectiveness in conveying physics concepts
- Inclusion of home-based practice activities

✔ Virtual Lab & Simulation Development for Home Learning

Task: Design an **interactive virtual experiment** that students can conduct on their own, using **readily available software or simple coding platforms** like Jupyter Notebooks, Glowscript, or VPython.

Evaluation Criteria:

- Accessibility and ease of use at home
- Engagement and interactivity of the simulation
- Educational impact on understanding physics

✔ **Computational Physics for Interdisciplinary Home Projects**

Task: Develop a **project-based learning activity** that integrates **computational physics** with another subject (e.g., biology, environmental science, engineering) and can be **completed at home** using publicly available datasets, simulations, or coding exercises.

Evaluation Criteria:

- Creativity in interdisciplinary application
- Use of computational techniques with minimal resources
- Feasibility for students to complete independently at home

✔ **Data-Driven Physics Education for Real-World Problems**

Task: Create a **student-friendly module** where learners **collect, analyze, and visualize real-world physics data** using open-source software (e.g., Python, LibreOffice Calc, Jupyter). Example: Analyzing motion using a mobile phone's accelerometer or tracking planetary motion using online datasets.

Evaluation Criteria:

- Feasibility for students using home-based tools
- Depth and accuracy of data analysis
- Ability to enhance computational thinking skills

How to register & What to do next

Follow the website: www.indapt.org.in

The detailed entry should be submitted via the Google Form:
https://forms.gle/G8xGeA7yE7jNDJeq6

An individual / the team leader in case of a group (*Max. three members*) must submit the required information, including the One-page Abstract with Title in pdf format, within May 31, 2025.

What to do next

(i) After the interaction meeting with participants, the team leader, incase of a group, or an individual must submit the Final pdf file within July 31, 2025, as is described in the following points, to theGoogle Classroom (Class Code to be sent to the individual mailbox after June 21, 2025) as an attachment.

(ii) The file must be named as '1/2/3-*First name of the team leader / single participant*'.pdf. 1/2/3 is to be used to mention the category. At the end, please append: _G (for Group Category) / _S (for Single).

(iii) It should contain a detailed write-up of their work (along with the computer program, if any), i.e. detailed theory with diagrams, procedure, observations, calculations, graphs, results, and references. In the case of physics simulations, the report should include a statement of the problem, formulation of the problem, flowchart, code/worksheet, test cases, and visualization of results using Gnuplot or such Open Source software. There is no limit on the number of pages. The participant(s) should write his/her (their) name(s), affiliation(s), and email(s) at the end of this file. Please mention the innovation you have incorporated with its importance regarding applications.

(iv) Please use Times New Roman (font size 12, spacing 1.5), and marginsshould be appropriate (1 inch on each side).

Selected entries (Award winners and special invitees, if any) from each category will be invited for demonstration at the upcoming IAPT convention. The dates and venue will be notified in due courseof time. The convention will likely be held during October 2025. The invited participants will be paid railway fare from the workplace to the convention place as per IAPT rules. In the case of joint authors, only one of the participants is eligible to receive TA (as per IAPT rules). The selected participant must come with his/her experimental setup for the final demonstration.

Your cooperation in abiding by the last date will be highly appreciated.

For any query:

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