



The Abdus Salam  
**International Centre  
for Theoretical Physics**



# Advanced School on Foundation Models for Scientific Discovery

## Description:

We are excited to announce the Advanced School on Foundation models for Scientific Discovery. This initiative, co-organized by ICTP alongside SISSA/TSDS, IBM and AREA, marks the first training activity co-sponsored under the ICTP-IBM partnership. The school targets early-career researchers and PhD students, aiming to bridge the gap between theoretical deep learning concepts and the application of foundation models to cutting-edge scientific problems. There will be a special focus on scalability, sustainability, and advanced HPC methods for optimizing deep learning pipelines.

## MORE INFORMATION:

Lecturers from top-ranked research centers/universities and big tech companies (e.g. IBM, Nvidia) will cover the topics listed below. Each topic will be complemented by the necessary tools to create efficient, scalable, and portable ML pipelines that exploit the capabilities of modern HPC infrastructures. 30 participants will be selected with attention to creating a cohort with balanced representation of countries (particularly, least developed countries), gender and under-represented groups. This school will be the second activity in the field of applied Machine Learning co-organised by the brand-new ICOMP (link: <https://www.ictp.it/home/consortium-scientific-computing>).

## TOPICS:

- Fundamentals of Foundation Models: Theory and Practice
- Transformers for tabular data
- Applications in climate science, astrophysics, material science and drug discovery
- Uncertainty Quantification (UQ) methods (to assess and incorporate uncertainty in predictions made by AI models)
- Explainable and trustworthy AI for scientific research
- Multimodal Learning



**10 - 18 July 202**



**Trieste, Italy**



**Deadline:  
30 April 2025**

## DIRECTORS:

Jean Barbier, ICTP  
Alberto Cazzaniga, AREA Science Park  
Serafina Di Gioia, ICTP  
Ivan Girotto, ICTP  
Teodoro Laino, IBM  
Roberto Trotta, SISSA

## LOCAL ORGANISER:

Serafina Di Gioia, ICTP

## FURTHER INFORMATION:

E-mail: [smr4088@ictp.it](mailto:smr4088@ictp.it)

Web: <https://indico.ictp.it/event/10853/>

Female scientists are encouraged to apply.

## GRANTS:

A limited number of grants are available to support the attendance of selected participants, with priority given to participants from developing countries. There is no registration fee.

