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## Overview

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# Introductory School on Parallel Programming and Parallel Architecture for High-Performance Computing | (smr 2877)

The School has the goal of teaching participating scientists about modern computer hardware and programming to provide a foundation for future computational research using High-Performance Computing (HPC). Participants will go through an intensive program with focus on practical skills most relevant to users of HPC resources of all sizes. They will learn to improve the efficiency of their research codes and to parallelize them. Lectures on a selection of technical aspects of modern HPC hardware will be mixed with introductions to widely used parallel programming tools and libraries. The hands-on sessions will allow participants to practice on small example problems of general scientific interest. Example topics will cover numerical methods, parallel strategies, as well as data management.

The program is specifically addressing the needs of scientists using, writing, or modifying HPC applications will not assume, require, or provide significant IT and HPC resource management skills. It will be mainly based on fundamental HPC-relevant features in widely used scientific software for high-performance computing:

- Computer architectures for HPC and how to optimize for them
- Parallel programming tools (MPI & OpenMP)
- Portable, flexible and parallel I/O (HDF5)
- Profiling, benchmarking and debugging
- High-Performance Libraries for the Solution of Common Math Problems

## Organizers

Shawn T. Brown, Ivan Girotto,  
Axel Kohlmeyer, Gavin Pringle,  
ICTP Local Organizer: Ivan  
Girotto

## Co-sponsors





# Mission - An institute run by scientists for scientists

- Foster the growth of advanced studies and research in physical and mathematical sciences, especially in support of excellence in developing countries.
- Develop high-level scientific programmes keeping in mind the needs of developing countries, and provide an international forum of scientific contact for scientists from all countries.
- Conduct research at the highest international standards and maintain a conducive environment of scientific inquiry for the entire ICTP community.
- Thanks to the generous funding from the Italian Government, UNESCO and the IAEA, ICTP has been able to initiate and implement various schemes of support and assistance to scientists from developing countries.





The Abdus Salam  
International Centre  
for Theoretical Physics





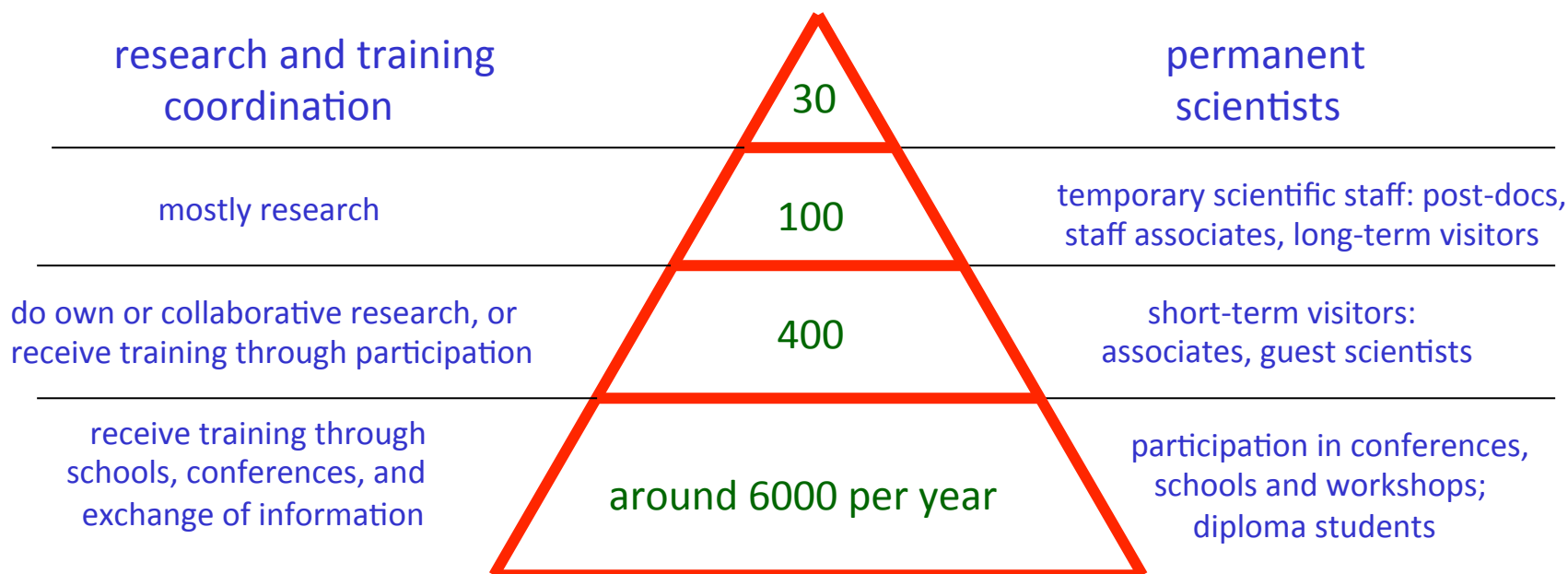
# ICTP Partner Institutes

- [Mesoamerican Centre for Theoretical Physics](#) has been established in Mexico in collaboration with the Universidad Autónoma de Chiapas (UNACH).
- The [ICTP Eurasian Centre for Advanced Research](#) (ICTP – ECAR) is a new regional centre of ICTP, which is currently in the process of being established in Turkey based on the agreement between ICTP and Izmir Institute of Technology (IZTECH).
- The [ICTP South American Institute for Fundamental Research](#), ICTP SAIFR, is a regional centre for theoretical physics created in collaboration with the State University of Sao Paulo (UNESP) and the Sao Paulo Research Funding Agency (FAPESP).
- Future centres are planned for Rwanda and China.





# ICTP from Trieste to the World



**Over 200.000 visit/year to the ICTP media (see [www.ICTP.TV](http://www.ICTP.TV)) for remote training!**



The Abdus Salam  
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50th Anniversary 1964–2014



International Atomic Energy Agency

Research ▼

Programmes ▲

Scientific Calendar

PRE-PHD PROGRAMMES	DEGREE PROGRAMMES	CAREER DEVELOPMENT	LABORATORY OPPORTUNITIES	SCIENTIFIC OUTREACH
ICTP Postgraduate Diploma Programme	Joint ICTP/SISSA PhD Programme in Physics and Mathematics	Federation Scheme	Training and Research in Italian Laboratories	Office of External Activities
ICTP/IAEA Sandwich Training Education Programme	Joint PhD Programme, Earth Science and Fluid Mechanics	Associates Scheme	ICTP-ELETTRA Users Programme	ICTP Partner Institutes
	Joint Masters in Physics		ICTP Laboratories	ICTP in Africa
	Joint ICTP/Collegio Carlo Alberto Program in Economics			Science Dissemination Unit
	International Master, Physics of Complex Systems			African Review of Physics
	Masters in Medical Physics			
	Masters in High Performance Computing			

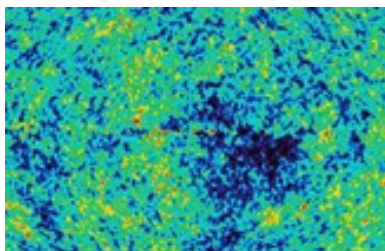


# ICTP Scientific Calendar

- Schools, Conferences, Workshops around the year
- Half of them on subjects related to main research areas (core)
- The rest on many subjects:  
medical physics, optics, nano physics, plasma physics, electronics, high performance computing, biophysics, satellite navigation, science dissemination and e-learning, m-science, entrepreneurship, nuclear physics (IAEA), teacher training, 3-D Printing, etc...
- <http://www.ictp.it/scientific-calendar.aspx>

# Scientific Sections

## High Energy Cosmology and Astroparticle Physics



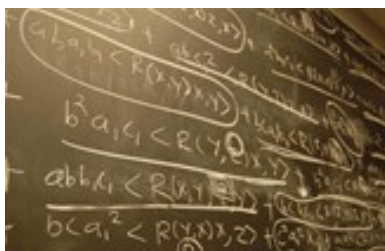
## Condensed Matters and Statistical Physics



## Earth System Physics



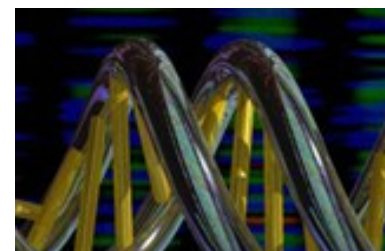
## Mathematics



## Applied Physics



## New areas





# High-Performance Scientific Computing activities at the ICTP

- HPC service and HPC application consulting
- HPC and Scientific Programming Dissemination (2016)
  - [The CODATA-RDA School of Research Data Science \(August 2016\)](#)
  - [Introductory School on Parallel Programming and Parallel Architecture for High-Performance Computing \(October 2016\)](#)





Introductory School on Pa... Welcome to Master in Hig...


www.mhpc.it

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**MHPC**  
Master in High Performance Computing

SISSA The Abdus Salam International Centre for Theoretical Physics

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**MASTER IN HIGH PERFORMANCE COMPUTING**

**MHPC**

The Master in High-Performance Computing (MHPC) is a high-level degree program that aims to train students to solve complex problems with HPC techniques.

**WHY**

Set in a stimulating research environment, the MHPC is an innovative, hands-on training and education program to prepare students for exciting careers in the fast-growing field of HPC.

**THE TARGET**

The master is intended for people with strong interest in advanced programming for scientific computing, software optimization and management of computing platforms.

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