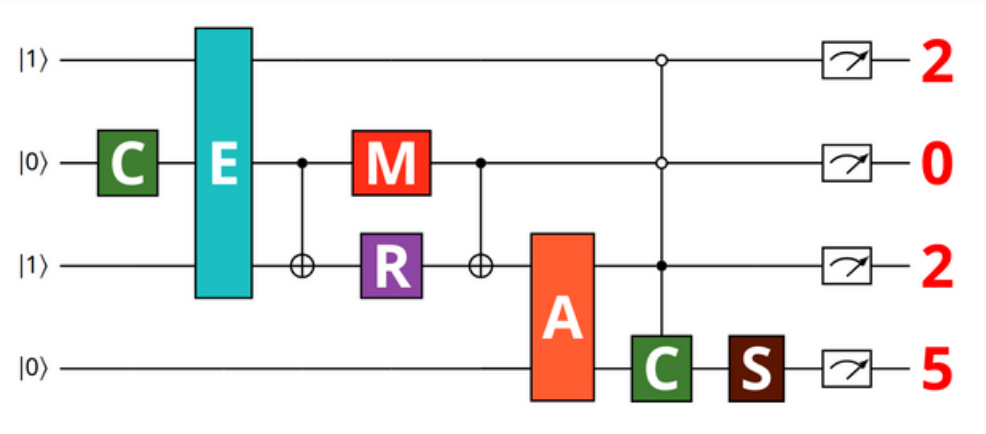
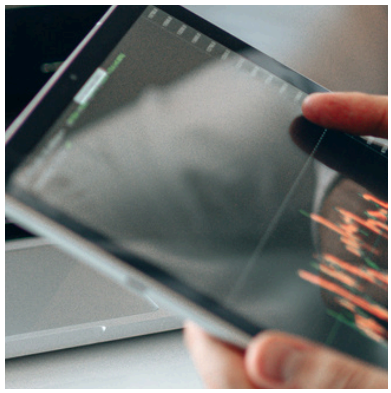
CEMRACS SUMMER SCHOOL 2025



QUANTUM COMPUTING

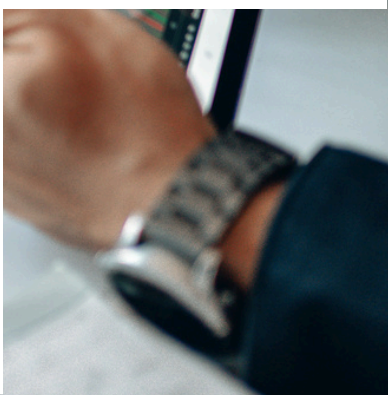
SCHOOL & RESEARCH PROJECTS

JULY 15 - AUGUST 22, 2025



CIRM, Marseille France

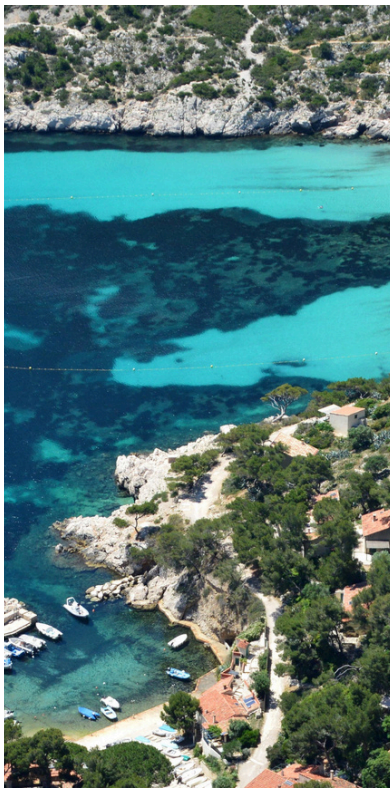
More Information



About CEMRACS

CEMRACS is a six-week international summer school that has been organized by SMAI every summer since 1996 at the Centre International de Rencontres Mathématiques (CIRM), located in the beautiful Luminy campus near Marseille.

The 2025 edition will focus on Quantum Computing, with a special emphasis on two key domains deeply impacted by quantum technologies: scientific computing and cryptography.



CEMRACS 2025 is organized by SMAI and CC-FR/Teratec and supported by:

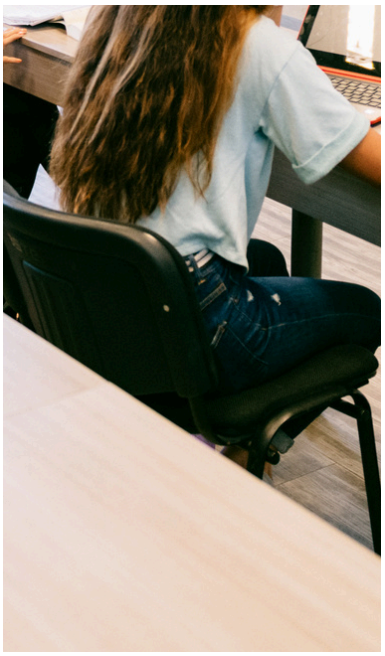
Scientific Scope

CEMRACS 2025 aims to :

Train young researchers in Quantum computing fundamentals, including ideal quantum computing frameworks and algorithms.

Explore the potential of quantum computing in scientific computations, including the adaptation and performance gains of existing algorithms in a quantum framework - part of the France Hybrid HPC Quantum Initiative

Focus on the need to develop Quantum cryptography and investigating new encryption methods for the post-quantum era.



Bridge the gap between scientific computing and cryptography, fostering collaboration across disciplines

Structure of the event

CEMRACS follows a two-phase structure:

1 SUMMER SCHOOL

1 week -
15-19 July 2025

In short

A week of lectures designed to provide participants with a strong foundation in quantum computing.

Details

The summer school is open to a wide community but also aims to provide a knowledge base for the participants who will stay for the following 5 weeks to work on a project.

2 RESEARCH PROJECT PHASE

5 weeks -
21 July - 22 August 2025

In short

Five weeks of Project-Based Research where participants collaborate on research projects proposed by industrial or academic partners.

Details

Each project team consists of 2-3 young researchers, supervised by experienced researchers from the proposing institution. The goal is to train the next generation of researchers in quantum computing and address real-world questions from industry and academia.

Key Dates

PROGRAMME

1

The **summer school week** (15-19 July) consists of four daily sessions:
- 9:00 AM - 10:30 AM: Lecture session
- 10:45 AM - 12:15 PM: Lecture session
- 2:00 PM - 3:30 PM: Presentation or computational practice
- 4:00 PM - 5:30 PM: Extended session or preparation for research projects

LECTURES

Paradigms for algorithms on different technologies
Thomas Ayral (EVIDEN Paris)

Quantum cryptography
Mina Doosti (University of Edinburgh)

Quantum cryptanalysis and post-quantum cryptography
Pierre-Alain Fouque (Université de Rennes, IUF)

Optimization problem on quantum computers
Yassine Hamoudi (Université de Bordeaux)

Quantum simulation of partial differential equations
Nana Liu (Shanghai Jiao Tong University)

Advanced quantum algorithms for scientific computing
Agnieszka Międlar (Virginia Tech)

Quantum computer hardwares
Mazyar Mirrahimi (Inria Paris)

Quantum error correction
Gilles Zémor (Université de Bordeaux, IUF)

PROGRAMME

2

The **Research Projects phase** takes place from July 21st to August 22nd, 2025.

During this phase, each participant works in a team on a collaborative research project proposed either by an industrial company or an academic team.

Teams are made up of 2 or 3 young researchers, supervized by experienced researchers provided by the company or academic team sponsoring the project.

Young researchers will be able to specify their preferences among the projects, and the committee will evaluate their requests and give feedback to all registrants.
Selected participants will then be contacted directly to prepare the project.

Participation & Registration

Open to all researchers, PhD students, and industry professionals.

Participants can attend the summer school only, or the full event. The summer school can be attended online.

To start the registration process, you first need to create an account on the website and log in. Registration forms for the school and for the Research Project Phase will then be available.

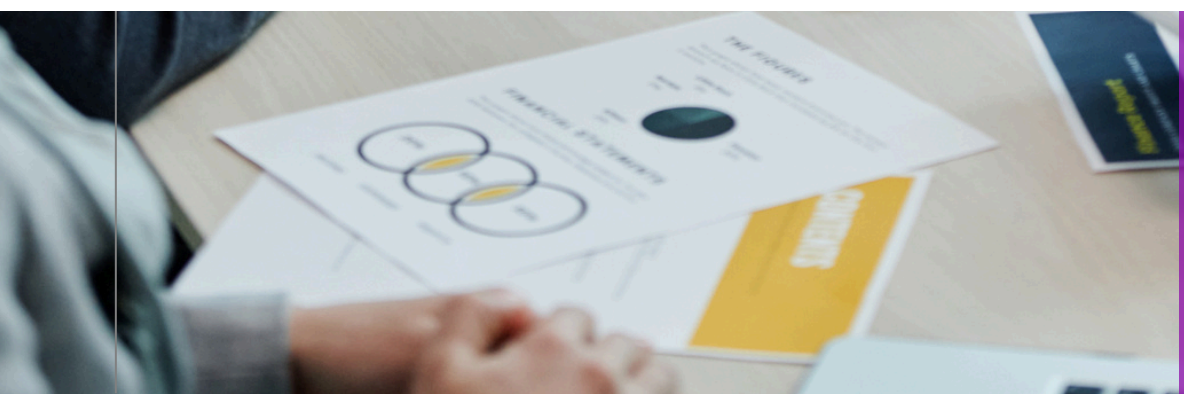
You can choose to be hosted on-site or not: registration fees, key dates and other details are available on the website.

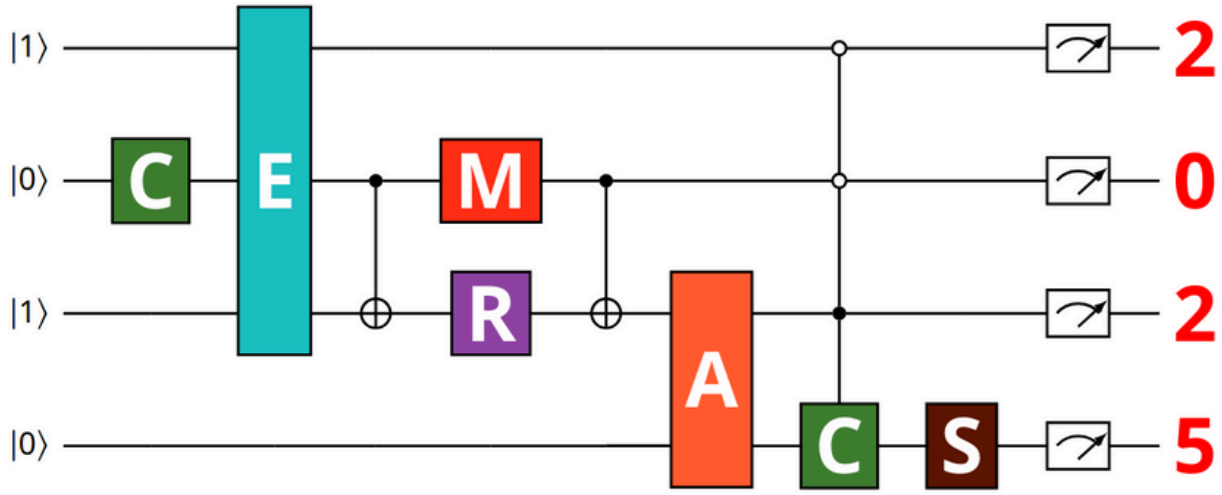
Looking for Industry & Academic Partnerships

Companies and institutions can support CEMRACS by:

- **Proposing and funding research projects for the 5-weeks phase**
- Providing financial support for the summer school or team participation.

If interested, you can contact the Organizing Committee:
cemracs25@smai.emath.fr





Thank You

If you have any question, please contact us:

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www.linkedin.com/company/cemracs-25/

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