SUMMER SCHOOL ON QUANTUM AND QUANTUM-INSPIRED COMPUTING

CURSO *ONLINE*
Aula Virtual UIMP
(https://campusvirtual.uimp.es)
Del 6 al 10 de septiembre de 2021

Código: 64YX - Tarifa A

CSIC
Consejo Superior de Investigaciones Científicas

This summer school is a five-day introduction to practical quantum computing with devices that are already, or will be soon, commercialized. Speakers will introduce the foundations of quantum computing, as well as its application in chemistry, physics, optimization and finance. The school will cover topics such as quantum programming (QISKIT), variational quantum computation and quantum machine learning. Students will be offered a selection of practical problems that can be addressed with quantum computers. They will work in teams to develop a piece of quantum software to solve the proposed tasks. The summer school has two practical 2-hour sessions, during which the school organizers will supervise the work by the students. Finally, each student team will present their work at the end of the school. In addition to practical aspects, speakers will also provide a vision of the future of quantum computing in terms of hardware development and applications.

This online summer school is ideally suited for final year students, PhD students in this ore related research fields, or professionals interested in learning quantum computing. Even though this is a short course, it will provide students with the necessary resources and orientation to start working and getting prepared for quantum computing. The summer school requires some background in quantum physics, as well as some basic knowledge of python. The required background is well within the level of a Physics lastyear student. Students with a different scientific degree, e.g. in Chemistry, Mathematics or Engineering, may also apply, however they are encouraged to at least carry out someprevious study or review of basic principles and ideas in quantum mechanics. For more information and/or additional questions, please, contact us at diego.porras@csic.es

Directors

Juan José García Ripoll
Investigador Científico. Instituto de Física Fundamental (IFF)
Consejo Superior de Investigaciones Científicas (CSIC)
Diego Porras Torre
Científico Titular
Instituto de Física Fundamental (IFF)
Consejo Superior de Investigaciones Científicas (CSIC)

Monday 06

09:30 h.Introduction to quantum computing I
Germán Sierra
Profesor de Investigación (CSIC)
12:00 h.Introduction to quantum computing II
Diego Porras Torre
15:30 h.Introduction to quantum programming with QISKIT
Juan Sánchez Toural
Qiskit Advocate

Tuesday 07

09:30 h.Variational quantum computing
Alba Cervera Lierta
Investigadora de la Universidad de Toronto
12:00 h.Practical uses of quantum computing in finance
Samuel Fernández-Lorenzo
Profesor del Instituto de Empresa y CEO de Inspiration-Q
15:30 h.Introduction to quantum machine learning
Alejandro Perdomo-Ortiz
Director asociado de Inteligencia Artificial en Zapata Computing

Wednesday 08

09:30 h.Introduction to tensor networks
María del Carmen Bañuls Polo
Científica en el Instituto Max Planck de Optica Cuántica
12:00 h.Quantum numerical analysis
Juan José García Ripoll
15:30 h.Practical Session
Diego Porras Torre
Juan José García Ripoll

Thursday 09

09:30 h.Tensor networks and quantum machine learning Roberta Zambrini

Implementations of QML &

Reservoir Computing

Jacobo Biamonte

Profesor en el "Skolkovo Institute of Science and Technology"

12:00 h.Quantum advantages and near-term quantum computing

Jens Eisert

Catedrático

Freie Universität Berlin

Friday 10

09:30 h.Implementations of QML & Reservoir Computing

Roberta Zambrini

Científica en el Instituto de Física Interdisciplinar y Sistemas Complejos

12:00 h.Practical Session

Diego Porras Torre

Juan José García Ripoll