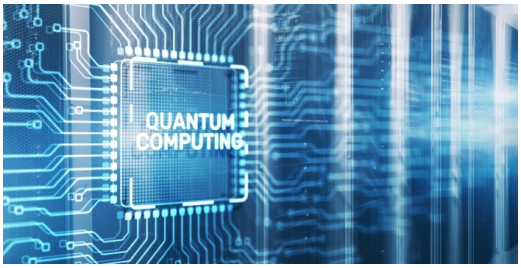
Quantum Computing: from fundamentals to applications



The program will cover topics ranging from theoretical foundations to available architectures and technologies, software development, quantum algorithms, and key applications.

10.Sep - 12.Sep 2025

Cod. Z23-25

Mod.:
Streaming Face-to-face

Edition
2025

Activity type
Summer course

Date
10.Sep - 12.Sep 2025

Location
Miramar Palace

Languages
English

Academic Validity
30 hours

Organising Committee

Description

Framed within the International Year of Quantum Technologies, this Summer Course offers a comprehensive overview of advancements in Quantum Computing, blending theory with practical applications. The program will cover topics ranging from theoretical foundations to available architectures and technologies, software development, quantum algorithms, and key applications. Additionally, it will explore crucial aspects such as quantum-classical hybridization and the expected industrial impact of these technologies.

Aimed at researchers, advanced students (in fields such as Physics, Mathematics, Engineering, and Computer Science), as well as industry professionals and academics, this course seeks to provide essential tools and knowledge to understand and leverage the potential of quantum computing across various scientific and industrial domains.

Objectives

Provide a comprehensive overview of the fundamentals and technological advancements in Quantum Computing, from its theoretical foundations to practical applications.

Organised by

BasQ
Basque Quantum

Program

10-09-2025

09:00 - 09:15 “Apertura del Curso por representante del Departamento de Ciencia, Universidades e Innovación“Presentation by the Director of the activity

Javier Aizpurua | BasQ - Director

09:15 - 11:30 “Fundamentos de la Computación Cuántica: conceptos y principios“

Juan José García Ripoll | CSIC - Investigador

11:30 - 12:00 Break

12:00 - 12:50 “Transmones Superconductores: arquitectura y aplicaciones“

Sebastian Bergeret --- | CFM - Research Scientist

13:00 - 13:50 “Puntos cuánticos en Computación Cuántica: enfoque y avances“

Fernando González Zalba | Quantum Motion - Ikerbasque Professor - Principal Quantum Engineer

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11-09-2025

09:00 - 09:50 “Átomos Fríos: control y aplicaciones en Computación Cuántica“

Francesca Ferlaino | DIPC / University of Innsbruck - Senior Researcher

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10:00 - 10:50 “Fotones en Computación Cuántica: tecnología y perspectivas“

Ponente Pendiente De confirmar | Quandela

11:00 - 11:30 Break

11:30 - 12:20 “Plataformas de desarrollo cuántico: Qiskit, Cirq, Braket, Pennylane, etc.“

Aitor Moreno Fdz. de Leceta | Ayesa - Director del Departamento Sistemas Inteligentes de Control y Gestión de Ibermática

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12:30 - 13:30 “Taller práctico: ejercicios básicos en la simulación y ejecución de algoritmos cuánticos en hardware real.“

Cristina Sanz | IBM - Engagement Manager en IBM Quantum

12-09-2025

09:00 - 09:15 Presentation by the Director of the activity

09:15 - 10:30	“Casos de uso en Computación Cuántica: Biomedicina“ **Sara Capponi** | IBM - Research Staff Member
10:30 - 11:45	“Casos de uso en Computación Cuántica: Energía“ **Rosana Martín** | Iberdrola - Responsable Proyectos Transformadores **Daniel Lestón**
11:45 - 12:15	Break
12:15 - 13:30	“Optimización Cuántica e Hibridación Cuántico-Clásica“ **Mitsuhisa Sato** | RIKEN
13:30 - 14:00	Closing session

Directed by

Javier Aizpurua

Ikerbasque, Profesor

Ikerbasque Research Professor at Donostia International Physics Center, DIPC, and distinguished researcher at the University of the Basque Country, where he leads the Nanophotonics Theory Group. Javier Aizpurua gained his doctorate in Physics at the University of the Basque Country (UPV/EHU) in 1998 for work on the interaction of rapid electrons and nanostructures. After his pre-doctoral stage, he spent two periods as a post-doctoral researcher, one at Chalmers Technology University in Gothenburg, Sweden, and the other at the US National Institute of Standards and Technology (NIST). In 2004, Aizpurua joined DIPC, the Donostia International Physics Center, as a research fellow, starting to train a nanophotonics group. In 2008 he was awarded a permanent scientific place at the CSIC, taking responsibility for the photonics line of research at CFM, the Materials Physics Centre in San Sebastián, where he worked until 2023. From this year on, he joined Ikerbasque. He obtained the Euskadi Research award 2022, and is currently the director of the strategy Basque Quantum.

Igor Campillo ---

Euskampus Fundazioa, Director

He is director of Euskampus Fundazioa, founded in 2011 by the University of the Basque Country (UPV-EHU), Tecnalia Corporation and the Donostia International Physics Center (DIPC). He worked as assistant professor in the Faculty of Sciences of the UPV/EHU, international projects manager in Gamesa Energy, researcher and project manager at LABEIN- Tecnalia, project and outreach manager in the Nanoscience Cooperative Research Center- nanoGUNE, manager of the nanoBasque Strategy in the Basque Business Development Agency- SPRI, and director of DeustoTech. He holds a PhD in Physics from UPV/EHU, and a master degree in journalism and science communication from the Spanish Open University. He is the author of more than 70 international scientific publications indexed in the Web of knowledge,and author of 3 international patents. He has been awarded as one of the word-leading “Boundary Spanners” for University Business Cooperation by the University Industry Innovation Network.

Teachers

Javier Aizpurua

Ikerbasque, Profesor

Ikerbasque Research Professor at Donostia International Physics Center, DIPC, and distinguished researcher at the University of the Basque Country, where he leads the Nanophotonics Theory Group. Javier Aizpurua gained his doctorate in Physics at the University of the Basque Country (UPV/EHU) in 1998 for work on the interaction of rapid electrons and nanostructures. After his pre-doctoral stage, he spent two periods as a post-doctoral researcher, one at Chalmers Technology University in Gothenburg, Sweden, and the other at the US National Institute of Standards and Technology (NIST). In 2004, Aizpurua joined DIPC, the Donostia International Physics Center, as a research fellow, starting to train a nanophotonics group. In 2008 he was awarded a permanent scientific place at the CSIC, taking responsibility for the photonics line of research at CFM, the Materials Physics Centre in San Sebastián, where he worked until 2023. From this year on, he joined Ikerbasque. He obtained the Euskadi Research award 2022, and is currently the director of the strategy Basque Quantum.

Sebastian Bergeret ---

CFM-CSIC

Sara Capponi

Francesca Ferlaino

University of Innsbruck and IQOQI

Juan José García Ripoll

Fernando González Zalba

Daniel Lestón

Rosana Martín

Aitor Moreno Fdz. de Leceta

Ponente Pendiente De confirmar

Licenciada en Biología por la Universidad Autónoma de Madrid (2005) y doctora en Genética y Biología Molecular por la Universidad del País Vasco (2009). En 2012, obtuvo el Máster en métodos de investigación y evaluación de servicios sanitarios y economía de la salud de la Universidad Nacional de Educación a Distancia (UNED). En 2015, obtuvo el LEAD - El certificado de Especialización en Liderazgo y Transformación en Organizaciones y Sistemas de Salud de Deusto Business School. En 2017, obtuvo el título sobre Eficiencia en la producción de servicios sanitarios "Marco conceptual y uso de software" en la Escuela de Salud Pública de Andalucía (España). En 2018, alcanzó el título sobre Aplicación de la metodología LEAN para la mejora de las vías asistenciales en la Escuela de Salud Pública de Andalucía (España). En 2019, realizó el Curso de Liderazgo y Organización para el Cambio del Institute for Healthcare Improvement (IHI). En 2021, logró el título de Epidemiología Avanzada de la Escuela de Salud Pública de Andalucía (España). Se incorporó al Instituto Kronikgune como investigadora a finales de 2012 y actualmente es la coordinadora científica.

Cristina Sanz

Mitsuhisa Sato

Registration fees

FACE-TO-FACE	UNTIL 10-06-2025	UNTIL 30-06-2025
General	120,00 EUR	-
Reduced fee regular	102,00 EUR	-
Registration exemptions	84,00 EUR	-
joung fee	84,00 EUR	25,00 EUR

LIVE ONLINE	UNTIL 10-06-2025	UNTIL 30-06-2025
General	120,00 EUR	-
Reduced fee regular	102,00 EUR	-
Registration exemptions	84,00 EUR	-
joung fee	84,00 EUR	25,00 EUR

Place

Miramar Palace

Pº de Miraconcha nº 48. Donostia / San Sebastián

Gipuzkoa