

Grenoble 6-10 January 2025

#QEI

quantum energy initiative

WORKSHOP 2025



Funded by the
European Union
NextGenerationEU

Traveling to Grenoble & Workshop Venue

TRAIN TO GRENOBLE:

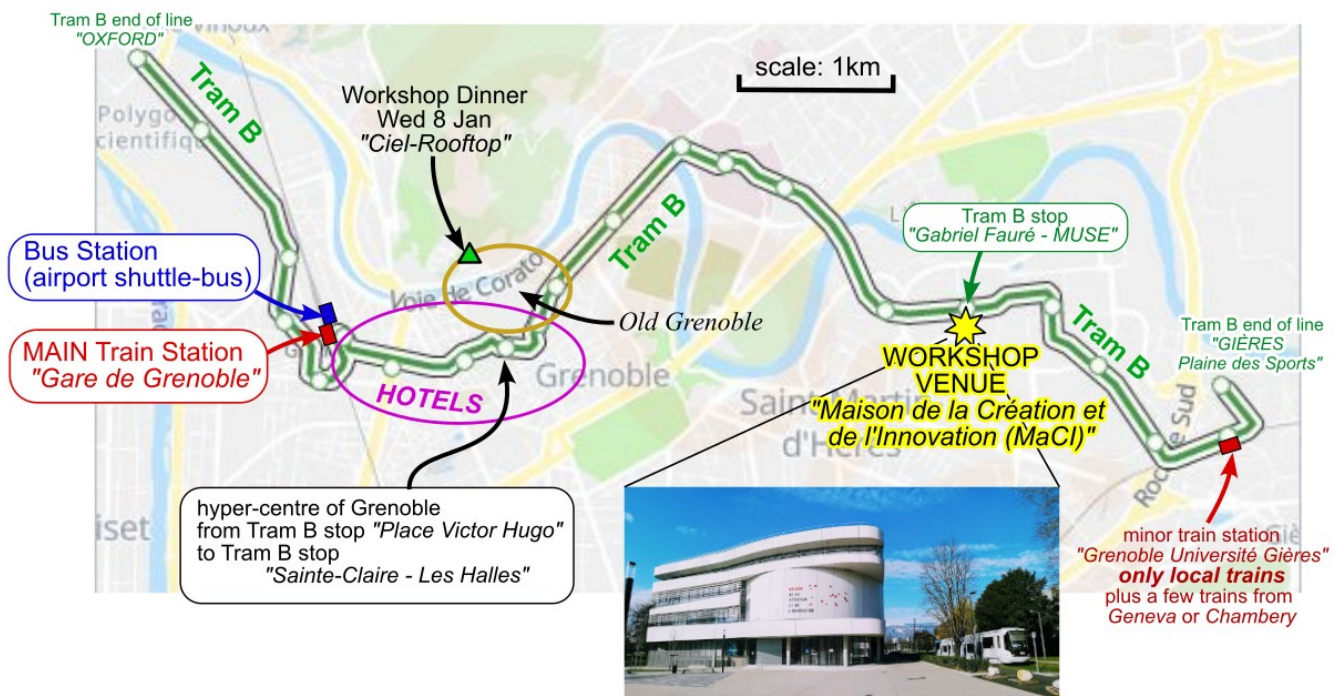
All trains stop at “**Gare de Grenoble**” (Grenoble’s main station) which is close to hotels. A few trains from Chambéry/Geneva also stop at “Grenoble Université Gieres”, which is slightly closer to the workshop venue (but further from hotels).

TRAVEL FROM AIRPORT LYON SAINT EXUPERY (LYS) :

There are shuttle buses to Grenoble every hour almost 24 hours per day. The shuttle bus (number X777) takes 1 hour and arrives at Grenoble bus station (just next to Grenoble main train station).

Link: <https://www.flixbus.fr/voyages-car/grenoble-aeroport-de-lyon-saint-exupery>

A second option from airport is to take the tram to Lyon, and then take a train from “**Lyon Part Dieu**” (Lyon’s main train station) to Grenoble, *but it takes longer*.



WOKSHOP VENUE: main amphitheatre in MaCI building “*Maison de la Création et de l'Innovation*”, centre of **Université Grenoble Alpes** campus.

From Grenoble downtown or train station: Tram B gets you to the venue in 20-25 mins (tram every 4-10 mins).

Tram Tickets: Ticket-machines at each tram stop. You scan the ticket on the **blue box** before entering tram (QR code **face up**), then you have 1 hour for travel.



- (1) Take **Tram B** in direction of "GIÈRES Plaine des Sports"
- (2) **Get off at the stop "Gabriel Fauré - MUSE"**.
- (3) Venue (Maison de la Création et de l'Innovation) is next to the tram stop.

Opens Streetmap: <https://www.openstreetmap.org/way/591246822>

Google Maps: [https://www.google.com/maps/place/Center+for+Creation+and+Innovation+\(MaCI\)/@45.1917834,5.7610023,17z?](https://www.google.com/maps/place/Center+for+Creation+and+Innovation+(MaCI)/@45.1917834,5.7610023,17z?)

Program of Quantum Energy initiative Workshop 2025

	Monday 6 Jan	Tuesday 7 Jan	Wed 8 Jan	Thurs 9 Jan	Friday 10 Jan
9:30am-		Yasser Omar	Keynote: Sabrina Maniscalco	Keynote: Coral Calero	Géraldine Haack
10am-		Oscar Gravier			1. Bresque
10:30am-		coffee break	coffee break	coffee break	2. Rondin
11am-		Danijela Markovic	Constantin Dalyac	with Poster Session 2	coffee break
11:30pm-		1. Meier	1. Emeriau		1. Brito
12pm-		2. Aguilar	2. Stevens		2. Verma
12:30pm-		3. de Assis	3. Shettell		3. Monbroussou
1pm-		LUNCH	LUNCH with posters from session 1	LUNCH with posters from session 2	workshop closing
1:30pm-	collect your badges				
2pm-	workshop opening		1. Pyurbeeva	Joseph Mikael	
2:30pm-	Keynote: Jukka Pekola	Poster Session 1 with	2. Yehia	Martin Plesch	
3pm-			3. Violaris	Ludovic Bellon	
3:30pm-	coffee break	coffee break	coffee break	coffee break	
4pm-	Irene d'Amico	Radim Filip	FREE TIME FOR DISCUSSIONS (create new collaborations)		
4:30pm-	1. Oftelie	QEI cofounder: Olivier Ezratty		Industrial Round Table	
5pm-	2. Campaioli				
5:30pm-	3. Woods	Group Discussions: ENERGY & SOCIETY in interaction with Social Scientists			
6pm-			Workshop Dinner		
7pm-			Ciel-Rooftop Restaurant		
8pm-					

Program version 2 Jan.

Check website for updates during workshop

Info on talk timings:

Keynotes = 50min +10min questions

Invited (blue) = 25min +5min questions

Contributed (orange) = 17min +3min questions

KEYNOTE TALKS

- Coral Calero (University of Castilla-La Mancha, Spain) - Green is the new black: concepts in software sustainability.
- Sabrina Maniscalco (Algorithmiq, Finland) - Quantum Chaos and Dual Unitary Systems: Pushing the Boundaries of Science with Quantum Computer.
- Jukka Pekola (Aalto University, Finland) - Superconducting circuits as a platform for quantum thermodynamics experiments.

INVITED TALKS (alphabetical order)

- Irene d'Amico (York University, UK) - Quantum thermodynamics under the lens of density functional theory.
- Ludovic Bellon (ENS Lyon, France) - Energetics of classic information erasure: the adiabatic limit.
- Constantin Dalyac (Pasqal, France) - Energy consumption of a neutral atom QPU for two use-cases.
- Olivier Ezratty (EPITA, QEI cofounder, France) - Quantum computing roadmaps and their energetics aspects.
- Radim Filip (Palacký University Olomouc, Czech Republic) - Rise of Quantum Coherences.

- Oscar Gravier (CEA-Leti & Quobly, Grenoble) - [Low-Distance Surface Code Emulation for Silicon-based Spin Qubits](#).
- Géraldine Haack (Geneva University, Switzerland) - [Transport-based quantum tomography in open quantum systems](#)
- Danijela Markovic (CNRS/Thales Paris, France) - [Energy efficiency of quantum neuromorphic computing](#).
- Joseph Mikael (EDF, France) - title to be announced
- Yasser Omar (Lisbon University, Portugal) - title to be announced
- Martin Plesch (Slovak Academy of Sciences, Slovakia) - [Optimizing NISQ computers](#).

CONTRIBUTED TALKS *(alphabetical order)*

- Milton Aguilar (Univ. Stuttgart) - [Correlated quantum machines beyond the standard second law](#).
- Léa Bresque (ICTP, Trieste) - [Stochastic information processing in a lazy quantum measurement engine](#).
- Frederico Brito (Univ. São Paulo & Abu Dhabi) - [Energy additivity as a requirement for universal quantum thermodynamical frameworks](#).
- Francesco Campaioli (Univ Padua) - [Extending the self-discharge time of Dicke quantum batteries using molecular triplets](#).
- Pierre-Louis De Assis (Univ. Campinas) - [Electrical energy cost of arbitrary state preparation with programmable integrated photonic circuits](#).
- Pierre-Emmanuel Emeriau (Quandela) - [Towards Quantum Energetic Advantage in Boson Sampling](#).
- Léo Monbroussou (Sorbonne & CNRS) - [Towards Quantum Advantage with Photonic State Injection](#).
- Florian Meier (TUWien) - [Autonomous Quantum Processing Unit: What does it take to construct a self-contained model for quantum computation?](#)
- Lindsay Offelie (NEST, Pisa) - [Dynamic Cooling of Qubits on Contemporary Quantum Computers](#).
- Eugenia Pyurbeeva (Hebrew University of Jerusalem) - [Thermoelectric spectroscopy for in situ characterisation of nanodevices](#).
- Loïc Rondin (Univ. Paris-Saclay & CNRS) - [Nano heat machines, efficiency and the role of inertia](#).
- Nathan Shettell (MajuLab/CQT Singapore) - [Entropic Cost of Statistical Inference](#).
- Jeremy Stevens (Alice&Bob) - [Determining the energy consumption of a quantum algorithm running on a superconducting cat-qubit based fault tolerant quantum computer](#).
- Harshit Verma (Eviden/MajuLab/CQT Singapore) - [Energetics of VQE algorithm](#).
- Maria Violaris (Oxford Quantum Circuits & Univ Oxford) - [Impossibility of universal work extraction from coherence: reconciling axiomatic and resource-theory approaches](#).
- Mischa Woods (Inria & Univ. Grenoble Alpes) - [Quantum Frequential Computing: a quadratic run time advantage for all computation](#).
- Raja Yehia (ICFO, Barcelona) - [Energetic Analysis of Emerging Quantum Communication Protocols](#).

GROUP DISCUSSIONS: ENERGY AND SOCIETY

(Tuesday 7 Jan 17:00 to 20:00 *with snacks*)

Organized by the Innovacs Team (Pierre Engerran, Fabrice Forest & Amelie Favreau)

We will divide into small groups mixing scientists from the QEI workshop with social scientists and other experts from Grenoble's Institutes. Our goal will be to discuss how society should balance the **costs** and **benefits** of any future quantum technology.

Each group will consider how quantum technologies might impact a particular sector of society in the year 2050. Proposed list of sectors of society:

- Industry
- Agriculture
- Space
- Transportation
- Power Supply & Smart Grids
- Healthcare
- Entertainment

Each group should consider how we balance the **benefits** and **costs** (particularly energy or resource costs) of some quantum technologies in that sector. The group should develop two-or-three scenarios, some **negative** (with costs likely to outweigh benefits) and some **positive** (with benefits likely to outweigh costs). Some scenarios can be realistically inspired by knowledge of concrete quantum technologies. However, other scenarios can be pure science-fiction, imagining a future quantum technology capable of almost anything! Both types of scenario are helpful in our goal of discussing how we (as a society) should balance the **benefits** and **costs** of future technologies.

The discussions will be greatly facilitated by the presence of social scientists and other experts on the social impact of the above sectors.

INDUSTRIAL ROUND TABLE DISCUSSION

(afternoon of Thursday 9 Jan)

Organized and chaired by Olivier Ezratty (EPITA & QEI cofounder)

Discussions with Researchers/Experts from Quantum Industries on topics such as

- ◆ How do energy and resources impact quantum industry road-maps at short and long term?
- ◆ What jobs exist in quantum industries, what is research like in quantum industries?
- ◆ ... and many other topics.

Participants (list to be confirmed):

- Pierre Jaeger **IBM Quantum** (world leader in quantum computing with *superconducting qubits*)
- Tristan Meunier, **Qobly** (start-up developing quantum computing with *silicon spin qubits*)
- Josep Borsch **Qilimanjaro** (start-up developing *analog* quantum computing)
- Constantin Dalyac **Pasqal** (start-up developing quantum computing with *atoms*)
- Pierre-Emmanuel Emeriau, **Quandela** (start-up developing quantum computing with *photons*)
- Joseph Mikael, **EDF** (Electricity producer/supplier researching applications of quantum computing)

POSTERS (*alphabetical order*)

1. Aiache Youssef. [Quantum Sensing of Temperature with Interacting Qubit Probes](#)
2. Aimet Stefan. [Experimentally probing Landauer's principle in the quantum many-body regime](#)
3. Barros Nicolas. [Learning efficient erasure protocols for an underdamped memory](#)
4. Benali Mohamed. [Light Trajectories and Thermal Shadows casted by Black Holes in a Cavity](#)
5. Bertin-Johannet Bruno. [Increasing the extracted power in hot-carrier solar cells with energy-filtered contacts](#)
6. Bossard Elisa. [Thermodynamic analysis of a fault-tolerant measurement-free bit-flip quantum memory](#)
7. Cerisola Federico. [Extra cost of erasure due to quantum lifetime broadening](#)
8. Chang Derek. [Information Structure in Multi-time Quantum Processes](#)
9. Chowdhury Farhan Tanvir. [Challenges in realising digital quantum simulation of dissipative spin dynamics](#)
10. Chrirou Chaimae. [Potential barriers make quantum thermoelectrics with nearly ideal efficiency at finite power output](#)
11. El Allati Abderrahim. [Non-Markovian effects on the performance of a quantum Otto refrigerator](#)
12. Höfer Johannes. [Calorimetric detection of single electron tunneling events](#)
13. Horodecki Karol. [Quantification of energy consumption of quantum resource generation](#)
14. Ichir Evan. [Conception of cryo-attenuators for dilution fridges](#)
15. Janovitch Marcelo. [Clean baths, clean qubits: thermodynamics of solid-state bath purification](#)
16. Khomchenko Iliia. [Cyclic Solid-State Quantum Battery: Thermodynamic Characterization and Quantum Hardware Simulation](#)
17. Kirchberg Henning. [Quantum Information Engine Revised: Measurement Time, Time-dependent Information Acquisition, Energy Cost, and Performance](#)
18. Koteva Konstantina. [Optimizing Energetic Efficiency in Silicon Spin Qubit Quantum Devices](#)
19. Lai Amalina. [Quantum multi-time processes in continuous variable systems](#)
20. Lam William. [Measurement of the Lindbladian of quantum computers with randomised Pauli measurements](#)
21. Lamblin Mathieu. [Quantum Spintronic Energy Harvester](#)
22. Lombard-Latune Camille. [Optimizing shortcut-to-adiabaticity with respect to thermodynamic costs](#)
23. Lutz Eric. [Combining energy efficiency and quantum advantage in cyclic machines](#)
24. Medina Ivan. [Anomalous discharging of quantum batteries: the ergotropic Mpemba effect](#)
25. Monsel Juliette. [Autonomous demon exploiting heat and information at the trajectory level](#)
26. Novotný Tomáš. [Generation of autonomous quantum resources by dissipative quantum systems](#)
27. Polo Beatriz. [Enhancement in energy storage precision using Nongaussian quantum batteries](#)
28. Prech Kacper. [Quantum thermodynamics of continuous feedback control](#)
29. Rinaldi Davide. [Advantage in quantum batteries: the role of energy fluctuations](#)
30. Sánchez Rafael. [Asymmetric thermalization in few-level systems](#)
31. Soret Ariane. [Symmetry shapes thermodynamics of macroscopic quantum systems](#)
32. Traore Diata. [Advancing quantum chemistry with quantum computing resources](#)
33. Tsunaki Lucas. [Diamond-Based Quantum Token \(DIQTOK\)](#)
34. Winczewski Marek. [Dissipation of Secrecy Resources in Quantum Networks](#)

Getting to the workshop dinner at Restaurant "Ciel Rooftop Grenoble" Wednesday 8 Jan 19:00 (food served at 19:30)

Take elevator to 4th floor of "Babel Community" Building
Address: 17 RUE MAURICE GIGNOUX, GRENOBLE

WALKING ACCESS:

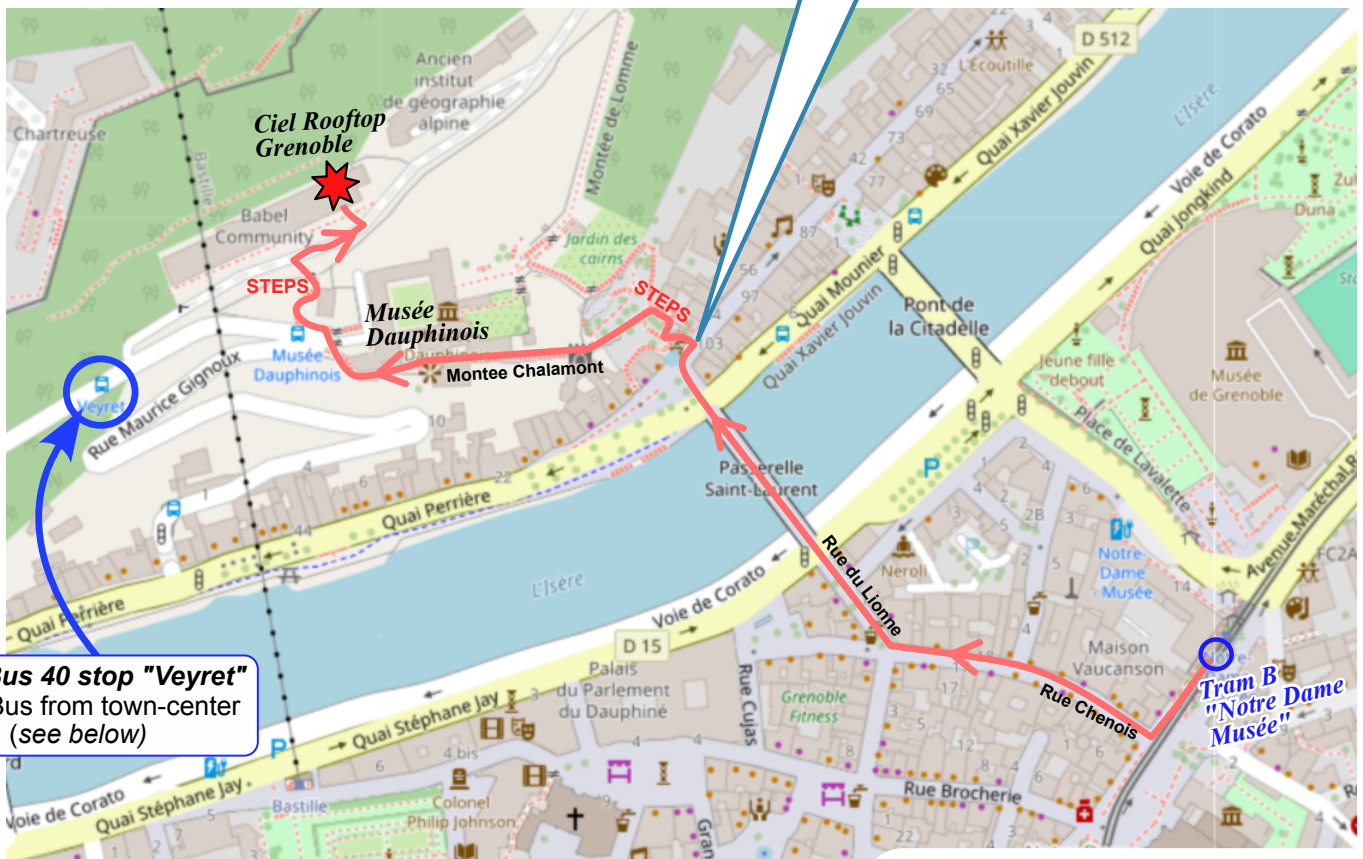
20 mins walk through old Grenoble from **Tram B "Notre Dame Musée"**.

Agreeable **but energetic** walk: it is a steep hill from river onwards, with steps and steep cobbled roads, climbing about 65 metres (like climbing a 25-floor building).

Strong/sports shoes recommended!

Go up the steps to the right of the **lion statue**

follow signs for **"Musée Dauphinois"**



Bus 40 stop "Veyret"
Bus from town-center (see below)



walking access via steps (see above map)

Note: the restaurant is in building that was recently renovated, after being abandoned for many years.

If you look on **google streetview** you will still see the building abandoned & covered in graffiti! Don't worry, that was **pre-renovation**.

BUS ACCESS: Take **Bus 40** from "Place Victor Hugo" in the town center at 18:50 or 19:05.

Get off the bus at "Veyret" (see above map).

Timetable:

www.reso-m.fr/ftp/fiche_horaires/fiche_horaires_2014/HORAIRES_40.pdf

No bus after the dinner, but walking down hill is easier!

OTHER ACCESS: if you cannot do this, then please contact the organizers about a taxi or shuttle.