

Title: Opening Remarks

Speakers:

Collection: Foundations of Quantum Computational Advantage

Date: April 30, 2024 - 9:00 AM

URL: <https://pirsa.org/24040090>



Workshop

### Organizers:

Rui Soares Barbosa (INL – Int. Iberian Nanotech Lab)  
Anne Broadbent (University of Ottawa)  
Ernesto Galvão (INL/UFF)  
Rob Spekkens (Perimeter Institute)  
Jon Yard (Perimeter Institute/Waterloo)

Logistics: Sarah Gardiner [conference@perimeterinstitute.ca](mailto:conference@perimeterinstitute.ca)



# Welcome to Perimeter Institute!

We're so pleased that you're here and look forward to the coming days of discussion and collaboration.

## Land Acknowledgement

In the spirit of understanding and learning from what has come before, Perimeter Institute respectfully acknowledges that we are located on the traditional territory of the Attawandaron, Anishnaabeg, and Haudenosaunee peoples.

Perimeter is situated on the Haldimand Tract, land promised to Six Nations, which includes six miles on each side of the Grand River. As settlers, we thank all the generations of people who have taken care of this land for thousands of years. We are connected to our collective commitment to make the promise and the challenge of Truth and Reconciliation real in our communities.

- ◉ If you are asking a question, please be sure to speak up so that the microphone can pick up your question and the participants joining us via Zoom will be able to hear you.
- ◉ Coffee breaks will take place in the main floor Bistro coffee bar area, and lunch and our Tuesday banquet dinner will be in the 2nd Floor dining room.
- ◉ If you need to use the washroom, they are located just outside the back doors of the theater and to the right, or through the door next to the coffee bar area downstairs.
- ◉ The timetable for the conference is available by scanning the QR code on the back of your nametag, please refer to it and help keep the schedule moving and on time.
- ◉ There is a Slack for the conference, and a link to join was sent in your conference email this morning.
- ◉ If you have any logistical questions or need support as a visitor to PI, you can stop by Visitor Services in office 128 or 129, located behind the reception desk in the main lobby, and Sarah, Phil or Amanda will be happy to assist you.

◉ **Foundations of Quantum Computational Advantage**

- joint theoretical EU-Canada project, funded by:



◉ Project website: <https://www.foqacia.org/>

◉ Coordinators: Anne Broadbent (Canada), Ernesto Galvão (Europe) Partners and PIs:



Ernesto Galvão  
Rui Soares Barbosa



Adán Cabello



UNIVERSIDAD  
DE GRANADA

Jara Juana Bermejo-Vega



Stockholm  
University

Ingemar Bengtsson



Ana Belén Sainz  
John Selby



Cihan Okay



Robert  
Raussendorf



Sven Bachman  
Andrew Potter



Nadish de Silva



Samson Abramsky



Jon Yard



Anne Broadbent

The goal of FoQaCiA is to develop new foundational approaches to shed light on the relative computational power of quantum devices and classical computers, helping to find the "line in the sand" separating tasks admitting a quantum speedup from those that are classically simulable.

The workshop will focus on the four central interrelated themes of the project:

1. Quantum contextuality, non-classicality, and quantum advantage
2. The complexity of classical simulation of quantum computation
3. The arithmetic of quantum circuits
4. The efficiency of fault-tolerant quantum computation





Schedule at <https://events.perimeterinstitute.ca/event/71/timetable/>

Tuesday, April 30, 2024	Wednesday, May 1, 2024	Thursday, May 2, 2024	Friday, May 3, 2024
8:30 AM Registration			
9:00 AM Opening Remarks			
9:15 AM Cohomological description of contextual measurement-based quant...	9:15 AM The how and why of translating between the circuit model and the o...	9:15 AM Emergence of noncontextuality under quantum darwinism	9:15 AM Quantum metrological limits in noisy environments
10:00 AM Reliable quantum computational advantages from quantum simulation	10:00 AM Learning quantum objects - Amira Abbas (University of Amsterdam)	10:00 AM Generalized contextuality as a necessary resource for universal qu...	10:00 AM GOLD-PLATED SICS - Ingemar Bengtsson (University of Stockholm)
10:45 AM Break	10:45 AM Break	10:45 AM Break	10:45 AM Break
11:15 AM Values for compiled XOR nonlocal games	11:15 AM Programming Clifford Unitaries with Symplectic Types - Jennifer Paykin (Intel)	11:15 AM Contextuality, entanglement, magic: many qubits, many questions	11:15 AM Conference Talk
12:00 PM Lunch	12:00 PM Lunch	12:00 PM Lunch	12:00 PM Closing Remarks
1:00 PM BosonSampling with a linear number of modes	1:00 PM Unclonability and How it links quantum foundations to quantum applications	1:00 PM Applying logical reductions to MIP* protocols	12:15 PM Lunch
1:45 PM Gong Show	1:45 PM Gong Show	1:45 PM //	1:15 PM Free Discussion
3:00 PM Break	3:00 PM Break	3:00 PM Break	
3:30 PM Simulating 2D lattice gauge theories on a qudit quantum computer	3:30 PM Stabilizer operators and Barnes-Wall lattices - Vadym Kliuchnikov (Microsoft)	3:30 PM Efficiently achieving fault-tolerant qudit quantum computation via gate tele...	
4:15 PM Free Time // Poster Session	4:15 PM Conference Talk - Graeme Smith (University of Waterloo)	4:15 PM Probing the limits of classical computing with arbitrarily connected...	
6:00 PM Dinner			

# FoQACIA

Thank you for your  
attention!

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the European Union

