

# Pierre-Antoine Graham

## Contact details

Email address: Pierre-Antoine.Graham@USherbrooke.ca

Phone number (mobile): (819) 944-2049

## EDUCATION

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**Université de Sherbrooke**

BSc in Physics

2019-2022

GPA: 4.29/4.30

**Perimeter Institute**

PSI-Start 2022 online school

2022 Summer

Earned all badges

**CEGEP de Trois-Rivières**

Sciences, letters, and arts

2017-2019

Cote R: 36

## PUBLICATIONS

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### Submitted to European Physical Journal C

Effective fluid mixture of tensor-multi-scalar gravity,

Marcello Miranda, **Pierre-Antoine Graham**, Valerio Faraoni, 8 November 2022, 10 p.

### Physical Review D

Critical solutions of nonminimally coupled scalar field theory and first-order thermodynamics of gravity,

Valerio Faraoni, **Pierre-Antoine Graham**, and Alexandre Leblanc, 11 October 2022, 11 p.

### Physical Review B

Disorder effects on hot spots in electron-doped cuprates,

C. Gauvin-Ndiaye, **P.-A. Graham**, and A.-M. S. Tremblay, 24 June 2022, 11 p.

### Submitted to Physical Review Letters

Photoinduced plasma oscillations in Weyl semimetals,

**Pierre-Antoine Graham**, Simon Bertrand, Michaël Bédard, Robin Durand, Ion Garate, 5 August 2022, 13 p.

## PROFESSIONAL EXPERIENCE

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2022 Summer, **Research assistant**,  
Physics & Astronomy Department,  
Professor Valerio Faraoni's group,  
Bishop's University.

2021 Fall, **Research assistant**,  
Physics Department,  
Professor Ion Garate's group,  
Université de Sherbrooke.

2021 Winter, **Research assistant**,  
Physics Department,  
Professor André-Marie Tremblay's group,  
Université de Sherbrooke.

2020 Summer, **Research assistant**,  
Physics Department,  
Professor Jeffrey Quilliam's group,  
Université de Sherbrooke.

2018, **Scientific host**,  
Champlain Observatory,  
CEGEP de Trois-Rivières.

2015-2018, **Scientific host**,  
Club des débrouillards, Technoscience,  
Mauricie, Centre-du-Québec.

- Study of critical solutions in the effective dissipative fluid picture of scalar-tensor gravity.
- Work on an adaptation of the first-order thermodynamics of the effective fluid picture to scalar multi-tensor gravity.
- Semi-classical analysis of the transient response of a Weyl Semimetal exposed to a magnetic field and a transient light pulse in the quantum limit.
- Analysis of two-particle self-consistent approach simulations of electron-doped NCCO to study the signature of its quantum critical point and its Fermi liquid behavior.
- Realization of a graphical user interface with Python to visualize and treat nuclear magnetic resonance data.
- Cryogenic laboratory manipulations.
- Outreach presentations about astronomy and cosmology.
- Handling of astronomical observation instruments.
- Dynamical scientific outreach of diversified concepts and organization of activities for kids of different age groups.

## POPULARIZATION PROJETS

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### Expo-Sciences participations, Hydro-Québec

#### Projects

2016, *Pas simple le pendule!*

2015, *Les équations de Maxwell*

2014, *Question de relativité!*

2013, *Ré-inventons la roue!*

#### Awards

- Antidote award
- Participation at the provincial finals
- UQTR Department of Chemistry, Biochemistry and Physics prize
- Participation at the provincial finals
- Chemin-du-Roy School Board Award
- Silver medal, junior category
- Quebec Ministry of Transport Award

### Popularization event, Diversity Committee (DiPhUS)

#### Projects

2021 Winter, *The «spin» of spin*

2022 Winter, *When complexifying simplifies*

2022 Fall, *Building a quantum clock*

- Connection between spin 1/2 and rotations.
- Solving electrostatics problems with conformal mapping.
- Concept of quantum clock and effect of gravity on nearby quantum clocks.

## CONFERENCES ATTENDED

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Summer 2022, Atlantic General Relativity Conferences (online)

Fall 2021, Introduction à la programmation quantique, Nord Quantique, Institut quantique (online)

## SCHOLARSHIPS

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2022, Hydro-Québec Scholarship (2500\$)

2020, J. Armand Bombardier Scholarship (1000\$)

2020, NSERC Undergraduate Student Research Award (6000\$)

2019, Physics Admission Scholarship (2000\$)

## EXTRACURRICULAR ACTIVITIES

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2021-2022, **DiPhUS Committee**,  
Physics Department,  
Université de Sherbrooke .

- Organization of activities promoting diversity and inclusion in the physics community.

2021-2022, **Physics tutor**,  
Université de Sherbrooke.

- Physics tutoring for students with diversified academic backgrounds from college to undergraduate level.

2019-2022, **President of social affairs**,  
Physics promotion 2019-2022,  
Université de Sherbrooke.

- Organization of activities promoting socialization of students from the Faculty of Sciences.

2018-2019, **Mathematics tutor**,  
CEGEP de Trois-Rivières.

- Organization of tutoring meetings for multiple students and adaptation to their level from precalculus to calculus.

## LANGUAGE AND COMPUTER SKILLS

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#### Languages

French (first language, 5/5), English (fluent, 4.5/5)

#### Programming languages

Python, Mathematica, C++, bash

#### Software

L<sup>A</sup>T<sub>E</sub>X, Asymptote vector graphics, Manim, PyTorch, Office