

# Carlos de Gois

MASTER'S STUDENT IN PHYSICS

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## Education

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### University of Campinas

Campinas, SP, Brazil

M.Sc. IN PHYSICS

2021

- Graduate thesis: "Classicality and dense coding in the prepare and measure scenario"
- Supervisor: Dr. Rafael Rabelo

### University of Campinas

Campinas, SP, Brazil

B.Sc. IN PHYSICS

2019

- Undergraduate thesis: "Formulating local models for entangled quantum systems"
- Supervisor: Dr. Rafael Rabelo

### Eötvös Loránd University

Budapest, Hungary

EXCHANGE STUDENT IN PHYSICS

2013-2014

- Scholarship awarded by CAPES's Science Without Borders program.

## Publications

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"General method for classicality certification in the prepare and measure scenario"

**C. de Gois**, G. Moreno, R. Nery, S. Brito, R. Chaves, R. Rabelo.  
PRX Quantum 2, 030311 (2021)

"Semi-device-independent certification of entanglement in superdense coding"

G. Moreno, R. Nery, **C. de Gois**, R. Rabelo, R. Chaves.  
Phys. Rev. A 103, 022426 (2021)

## Presentations

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### Measurement classicality in the prepare and measure scenario

SAMOP DPG Conference 2021, Online.

## Research experience

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- 2019–2021** **Master's student (Correlations in the prepare and measure scenario)**, Investigated the prepare and measure correlation scenario. In the case of classical shared randomness, we developed the first general method to certify classicality, and showed that measurement incompatibility is not sufficient for nonclassical correlations. When shared quantum entanglement is allowed, we showed that this system can be used for witnessing entanglement and self-testing, among other results.
- 2018–2019** **Undergraduate researcher (Quantum steering)**, Implemented general methods to formulate local models in EPR steering scenarios. We found a numerical lower bound expressing that  $\approx 40\%$  of all entangled two-qubit states are local — a twofold improvement on the previously known result.
- 2015** **Undergraduate researcher (Chaotic optical microresonators)**, Designed and numerically analyzed (through FDTD and FEM methods) silicon-based optical resonators to investigate signatures of quantum chaos.
- 2012–2013** **Undergraduate researcher (Semiconductor lasers)**, Microfabricated and characterized GaAs diode lasers to investigate the losses induced by using rapid ion etching — a possible method to allow chip integration — instead of the usual mechanical cleaving process.

## Professional experience \_\_\_\_\_

- 2020-2 **Teaching Assistant (Thermodynamics)**, Undergraduate course on thermodynamics and kinetic theory, aimed at 3rd-year students. I held discussion sessions for 4-hours/week with the students to aid in their coursework.
- 2020-1 **Teaching Assistant (Experimental Physics 1)**, Undergraduate course on experimental physics. I taught a subset of the lectures, wrote one of the exams and one of the experiments, graded the students' coursework and wrote supplementary material for the course.

## Professional development \_\_\_\_\_

### RELEVANT COURSES

#### **XIII CBPF School,**

- Topics in open quantum systems (Prof. Diogo Soares Pinto)
- Generalizing Boltzmann-Gibbs statistical mechanics (Prof. Constantino Tsallis)

#### **A Mini-Course on Quantum-Information Thermodynamics**, Taught by Drs. N. Yunger Halpern and M. Lostaglio

#### **VII Paraty Quantum Information School and Workshop,**

- Characterising quantum correlations via semi-definite programming (Dr. Daniel Cavalcanti)
- Quantum computing over the rainbow: continuous-variable quantum information in the optical frequency comb (Prof. Olivier Pfister)
- Open Quantum System Dynamics (Prof. Sabrina Maniscalco)
- High-dimensional Quantum Information (Dr. Yelena Guryanova)
- Entangled Structures in Classical and Quantum Optics (Prof. A. Zelaquett Khoury)
- Quantum Machine Learning (Dr. Alejandro Perdomo-Ortiz)

#### **Foundations of quantum theory**, Graduate course taught by Dr. Rafael Rabelo

#### **Quantum information theory**, Graduate course taught by Dr. Marcos César de Oliveira

#### **Complexity of algorithms**, Graduate course taught at taught by Dr. Lehlton Pedrosa

#### **Introduction to quantum optics**, Mini-course taught by Prof. Sebastião Pádua

#### **Introduction to quantum optics**, Mini-course taught by Dr. Cecilia Cormick

### CONFERENCES ATTENDED

- 2021 **Diversity in Quantum Computing Conference**, Online
- 2021 **CTP Quantum Information Days 2020(+1)**, Online
- 2019 **VII Paraty Quantum Information School and Workshop**, Paraty, Brazil
- 2014 **Industrial Physics in Emerging Economies II**, University of Campinas

### OTHER EXPERIENCES

- 2015 **Young Physicists' Tournament (Examiner)**, Brazilian stage of the tournament
- Writing, proofreading and copyediting**, Several professional development courses
- Computer assembly and maintenance**, Professional development course
- Webdesign and image editing**, Professional development course

## Grants \_\_\_\_\_

- 2019-2021 **M.Sc. FAEPEX Scholarship Grant no. 3044/19**, Graduate studies scholarship
- 2013-2014 **CAPES Science Without Borders Scholarship**, Exchange studies scholarship to Eötvös Loránd University
- 2012-2013 **PIBIC/CNPq Scholarship**, Undergraduate researcher scholarship

## Languages \_\_\_\_\_

## SPOKEN

**Portuguese** | Native

**English** | Advanced (TOEFL iBT 117)

**Spanish** | Advanced reading and listening

## PROGRAMMING

**Python** (NumPy, SciPy, PICOS, CVXPY) | Fluent

**Mathematical optimization** | Experience with MOSEK and Gurobi solvers

**MATLAB** | Fluent

**Mathematica** | Intermediate

**LabVIEW** | Intermediate

**Lisp/Scheme** | Beginner

**C** | Beginner