

## **CURRICULUM VITAE:**

### **CRISTIAN JOANA**

IRMP, Chemin du Cyclotron 2,  
Louvain-la-Neuve, 1348 Belgium  
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**website:** <https://cjoana.github.io/>

#### **PROFILE:**

I am third year PhD student in theoretical physics and cosmology at the University of Louvain, under the supervision of Prof. C. Ringeval (UCLouvain) and Prof. S. Clesse (ULB).

I am involved in the use and development of numerical relativity tools to study the non-linear dynamics and backreactions of the Early Universe. My research focus are in inflation, reheating and formation of primordial black holes.

I am part of the developing team of GRChombo ([www.grchombo.com](http://www.grchombo.com)), a open source numerical relativity code that I use for my simulations. I am also a member of the LISA-PBH working group.

In the past, from 2016 to 2019, I engaged in neuroscience research in Prof. S. Gruen lab (INM-6) in the Juelich Research center. I contributed to the data analysis of the Active-Vision project, a collaboration that is still ongoing.

#### **ACADEMIC RECORDS:**

- **2019/22**                      **(Candidate for) PhD in Physics (FRNS - FRIA)**  
   *at IRMP, CURL, University of Louvain, Belgium*
- **2014/16**                      **Master's degree in Physics, major in QFT and Gauge theories**  
   *at RWTH Aachen University, Aachen, Germany.*
- **2009/13**                      **Degree (EEES) in Physics, mention in Fundamental Physics**  
   *at Autonomous University of Barcelona, Catalonia.*

#### **SCIENTIFIC GRANTS AND AWARDS:**

- **2020**                              **ICERM visiting grant** (3 months),  
   *National Science Foundation and ICERM's Federal funds, NSF, USA*
- **2019/21**                      **FRIA grant** (bourse de doctorat),  
   *Fonds de la Reserche Scientifique, FRS-FNRS, Belgium*

#### **RESEARCH EXPERIENCE:**

- **2019/22**                      **(Candidate) PhD in Physics at CURL, University of Louvain (Belgium)**  
   Supervisors: **Christophe Ringeval** (UCLouvain), **Sebastien Clesse** (ULB)  
   Topic: *Inhomogeneous Early Universe cosmology*  
   Keywords: Inflation, Reheating, Primordial black holes, Numerical-GR

- 2016/19                      **Research assistant at the Institute of Neuroscience and Medicine (INM-6), Juelich Research Centre (Germany)**  
Lab PI: **Sonja Gruen** (FZ-Juelich)  
Topic: *Neuronal activity during active visual sensing*  
Keywords: Neural data analysis, Macaque electrophysiology, spike-sorting
  
- 2013/14                      **Internship researcher at the National Institute Informatics, Tokyo, (Japan)**  
Lab PI: **Tim Byrnes** (currently at NYU Shanghai)  
Topic: *Negative Wigner function light from exciton-polariton systems.*  
Keywords: Continuous-Variables Quantum Computing, Quantum optics

### **TEACHING EXPERIENCE:**

- 2021                      **Tutor in Quantum Mechanics II (UCLouvain)**
- 2020                      **Tutor in Quantum Mechanics II (UCLouvain)**
- 2019                      **Tutor in Quantum Mechanics II (UCLouvain)**
- 2017/18                  **Tutor in Computational Neuroscience (RWTH Aachen)**
- 2017                      **Tutor in the Advanced Neural Data Analysis '17 school (FZ-Juelich)**

### **OTHER EDUCATION AND TRAINING:**

- 2020                      **Advances in Computational Relativity workshop**  
at ICERM, Brown University, Providence (USA)
  
- 2019                      **Gravitational wave astronomy summer school**  
at ICTS, Bangalore (India)
  
- 2017                      **(Tutor) Advanced Neural Data Analysis 2017 summer school**  
at Juelich Research Center, Juelich (Germany)
  
- 2016                      **Workshop ‘Cosmology after Planck: what is next?’**  
at Ecole de Physique des Houches (*France*)
  
- 2014                      **ESI-EMS-IAMP Summer school on Mathematical Relativity**  
Erwin Schrödinger Institute, Vienna (*Austria*)

### **PERSONAL DETAILS AND SKILLS:**

Nationality:	Catalan, Spanish
Date of birth:	01-05-1990
Status:	Single
Languages:	Native in Catalan and Spanish, Proficiency in English Intermediate level in French and German.
ICT Skills:	Debian GNU/Linux based Operative Systems, Microsoft Windows. Programming in C/C++ and Python, <i>Mathematica</i> <sup>TM</sup> , <i>LaTeX</i>
Hobbies:	Reading, playing chess, traveling and hiking.

## **LIST OF PUBLICATIONS:**

1. Joana, C. Clesse, S. (2021) "Inhomogeneous pre-inflation accross Hubble scales in full general relativity", Phys. Rev. D 103, 083501 (2021). arXiv:2011.12190
2. Joana, C., van Loock, P., Deng, H., & Byrnes, T. (2016). "Steady-state generation of negative-Wigner-function light using feedback". Phy. Rev. A, 94, 063802 (2016). arXiv:1612.00629

## **GIVEN AND CONTRIBUTED TALKS:**

- *The inhomogeneous pre-inflationary era: A numerical relativity approach*  
Cristian Joana, Sebastien Clesse  
GRChombo workshop '20, Oxford University, Oxford, UK, 2nd December 2020
- *Graviational waves from the inhomogeneous pre-inflationary era*  
Cristian Joana, Sebastien Clesse  
Belgian Graviational Wave Seminars, KU-Leuven, Leuven, Belgium 25th November 2020
- *The inhomogeneous pre-inflationary era*  
Cristian Joana, Sebastien Clesse  
Advances in Computational Relativity, ICERM, Brown University, US, 12th November 2020
- *Layer specific modulation of response latency in V1 under active and passive viewing conditions.*  
Junji Ito, Cristian Joana, Yukako Yamane, Pedro Maldonado, Sonja Grün  
EITN workshop, Paris, France, 26th November 2019
- *Activity of visual cortex neurons differs between passive stimulation and active free viewing*  
Junji Ito, Cristian Joana, Yukako Yamane, Pedro Maldonado, Sonja Grün  
ECVP, Leuven, Belgium, 28th August 2019
- *GR-Hydrodynamics (perfect fluid) simulations with GRChombo*  
Cristian Joana  
GRChombo workshop '19, KCL, London, UK, 11th June 2019
- *Inhomogeneous scalar field dynamics and backreactions in non-conformally flat spacetimes*  
Cristian Joana, Sebastien Clesse  
GRChombo workshop '19, QMUL, London, UK, 19th February 2019
- *Neural correlates in macaque V1 and IT during active and passive vision*  
Cristian Joana, Junji Ito, Yukako Yamane, Pedro Maldonado, Sonja Grün  
Universidad de Chile, BNI - Neurosistemas, Santiago de Chile, Chile
- *Steady-state generation of negative Wigner function light with exciton-polaritons*  
Cristian Joana, Peter van Loock, Hui Deng, Tim Byrnes  
Quantum Manipulations of Atoms and Photons 2015, Shanghai, China, 27th Oct 2015
- *Negative Wigner function distribution light generated by coherent excitation of polaritons*  
Cristian Joana, Peter van Loock, Tim Byrnes  
WE-Heraeus-Seminar: Continuous Variable Entanglement in Atomic Systems: Fundamentals and Applications, Bad Honnef, Germany, 11th May 2015