CURRICULUM VITAE:

CRISTIAN JOANA

IRMP, Chemin du Cyclotron 2,
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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), 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, and a manuscript is currently in progress of publication.

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 Physic**s, **mention in Fundamental Physics**
at Autonomous University of Barcelona, Catalonia.

SCIENTIFIC GRANDS 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 Institue 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, *Mathematica™, LaTeX*
Hobbies:	Reading, playing chess, traveling and hiking.

LIST OF PUBLICATIONS:

1. Joana, C. (2021) "Higgs inflation in full general relativity: Preinflation and preheating with auxiliary field coupling", *(in-progress)*
2.
3. Joana, C., Clesse, S. (2021) "Inhomogeneous pre-inflation accross Hubble scales in full general relativity", Phys. Rev. D 103, 083501 (2021). arXiv:2011.12190

4. 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-Hidrodynamics (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