

## **CURRICULUM VITAE:**

### **CRISTIAN JOANA**

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## **ACADEMIC RECORDS:**

- **2023/ present**      **Postdoctoral researcher**  
at Institute of Theoretical Physics – Chinese Academy of Science (ITP-CAS),  
Beijing, P. R. China.
- **2019/22**            **PhD in Physics (FRNS - FRIA)**  
at IRMP, CURL, University of Louvain, Louvain-la-Neuve, 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/Spain.

## **RESEARCH EXPERIENCE:**

- **2019/22**            **PhD in Physics at CP3/CURL, University of Louvain (*Belgium*)**  
Supervisors: **Christophe Ringeval** (UCLouvain), **Sebastien Clesse** (ULB)  
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)  
Keywords: Neural data analysis, visual cortex, electrophysiology, spike-sorting
- **2013/14**            **Internship researcher at the National Institute Informatics, Tokyo, (*Japan*)**  
Lab PI: **Tim Byrnes** (currently at NYU Shanghai)  
Keywords: Continuous-Variables Quantum Computing, Quantum optics

## **SCIENTIFIC GRANTS AND AWARDS:**

- **2020**                **ICERM visiting grant** (3 months),  
National Science Foundation and ICERM's Federal funds, **NSF**, USA
- **2020/21**            **Co-I, PRACE Tier-0 No. 2018194669** (6 months),  
30M CPU/hrs, Computational Grant

- **2019/22**                    **FNRS - FRIA grant** (bourse de doctorat, 4 years),  
Fonds de la Reserche Scientifique, **FRS-FNRS**, Belgium
- **2013**                        **NII International Internship Program** (6 month)  
National Institute of Informatics, **Sokendai**, Japan

#### **TEACHING EXPERIENCE:**

- **2019/20/21**                **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:**

- **2021**                        **Tonale winter school of cosmology 2021**  
at Paso del Tonale, (Italy), organized by Heidelberg University (Germany)
- **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, Programming in C/C++ and Python, <i>Mathematica</i> <sup>TM</sup> , <i>LaTeX</i>
Hobbies:	Reading, playing chess, traveling and hiking.

## RESEARCH ACHIEVEMENTS:

### LIST OF PUBLICATIONS: (PUBLISHED)

#### GR-QC, ASTRO-CO, HEP-Th:

1. Andrade, T., Joana C. et, al. (2021) "GRChombo: An adaptable numerical relativity code for fundamental physics", Journal of Open Source Software, 6(68), 3703, <https://doi.org/10.21105/joss.03703>
2. Joana, C., Clesse, S. (2021) "Inhomogeneous pre-inflation accross Hubble scales in full general relativity", Phys. Rev. D 103, 083501 (2021). arXiv:2011.12190
3. Joana, C. (2022) "Gravitational dynamics of Higgs inflation: Preinflation and preheating with an auxiliary", Phys. Rev. D, vol. 106, pp. 023504 (2022). arXiv:2202.07604

#### INTERDISCIPLINARY:

4. Ito, J., Joana, C., Yamane, Y., Fujita, I., Tamura, H., Maldonado, P., Gruen, S. (2022), "Latency shortening with enhanced sparseness and responsiveness in V1 during active visual sensing", Sci Rep **12**, 6021 (2022)
5. 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

### SELECTION OF MANUSCRIPTS IN PROGRESS: (IN PROGRESS)

6. C. Joana, S. Clesse, Primordial black hole formation after collapse of asymmetric curvature perturbations, (*in progress*)
7. LISA Collaboration (2022), (WHITE PAPER) "Recent Primordial Black Hole scenarios and their gravitational-wave signatures", (*in progress*)
8. LISA Collaboration (2022), (WHITE PAPER) "Cosmology with the Laser Interferometer Space Antenna", arXiv:2204.05434
9. Yamane, Y., Ito, J., Joana, C., Fujita, I., Tamura, H., Maldonado, P., Gruen, S. (2022), "Neuronal population activity in macaque visual cortices dynamically changes through repeated fixations in active free viewing", (*Submitted for Publication at eLife*)

## **GIVEN AND CONTRIBUTED TALKS:**

\* (Underline names refers to the author who gave the presentation)

- Numerical relativity in Cosmology  
Cristian Joana  
Gravity-matters seminars, University of Oslo, 28<sup>th</sup> November 2022
- Visualitization tools for GRChombo: Yt and Visit  
Cristian Joana  
GRChombo meeting '22 I , Cambridge U., 30th March 2022
- Dynamics of pre- and post - Higgs inflation  
Cristian Joana  
GRChombo meeting '22 I, Cambridge U., 29th March 2022
- Gravitational dynamics of Higgs pre-inflation and preheating  
Cristian Joana  
Oxford gr-qc JC, Oxford U., 3th March 2022
- Simulations of the early Universe with numerical General Relativity  
Cristian Joana  
Tonale winter school of cosmology, Tonale, Italy, 8th December 2021
- Exploring the early Universe with numerical General Relativity  
Cristian Joana  
Belgian Graivational-Wavel Meeting, ULB, Brussels, 3rd November 2021
- The inhomogeneous pre-inflationary era: A numerical relativity approach  
Cristian Joana  
GRChombo workshop '20 II, Oxford U., Oxford, UK, 2nd December 2020
- Graviational waves from the inhomogeneous pre-inflationary era  
Cristian Joana  
Belgian Graviational Wave Seminars, KU-Leuven, Leuven, Belgium 25th November 2020
- The inhomogeneous pre-inflationary era  
Cristian Joana  
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-Hidroynamics (perfect fluid) simulations with GRChombo  
Cristian Joana  
GRChombo workshop '19 II, KCL, London, UK, 11th June 2019

- Inhomogeneous scalar field dynamics and backreactions in non-conformally flat spacetimes  
Cristian Joana  
GRChombo workshop '19 I, 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