Carlos Alfonso Conde Ocazionez

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EDUCATION

Ph.D. in Physics — **Urbana-Champaign, USA**
University of Illinois at Urbana-Champaign — *August 2021 - Present*
Relativity Research Group, Yunes Gravity Theory Research Group

- Research Areas: *Neutron Stars, Gravitational Waves, Black Holes.*
- Relevant Coursework: *General Relativity (Compact-Binaries), Neutron Stars.*

Master of Science in Astronomy — **Bogotá, Colombia**
National University of Colombia, National Astronomical Observatory — *July 2017 - December 2019*
Astronomy, Astrophysics and Cosmology Research Group

- Laureate honour thesis
- Master's thesis : *"Gravitational radiation from the inspiral of compact binaries based on a Yukawa-type addition to the Newtonian potential"*
- Relevant Coursework: *Classical Black Holes, Astrophysics, Fundamental Astronomy, Cosmology, Relativistic Celestial Mechanics.*

Bachelor of Science in Physics — **Bogotá, Colombia**
National University of Colombia, National Astronomical Observatory — *August 2013 - July 2017*

- Undergraduate thesis: *"Motion of S0-2 and S0-102 stars around the supermassive black hole Sgr A*"*
- Relevant Coursework: *Relativity, General Relativity, Galactic Dynamics, Astrophysical Objects.*

WORK EXPERIENCE

Research Assistant — **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign — *May 2025 - Present*

- Compared high-order Hartle–Thorne solutions with numerical relativity results for rotating neutron stars.
- Studied how neutron star observables respond to variations in microscopic nuclear parameters of realistic equations of state.
- Contributed to studying finite-temperature impacts on neutron star observables.

Teaching Assistant, University Physics: Mechanics — **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign — *January 2025 - May 2025*

- Facilitated weekly discussion sessions for 24 students, presenting key concepts and supporting group-based problem solving in mechanics.
- Assessed weekly quizzes, providing targeted feedback to reinforce student understanding.
- Held weekly office hours to support student learning.

Research Assistant — **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign — *May 2024 - December 2024*

- Conducted studies on the Hartle-Thorne approximation up to seventh order in spin of a neutron star.
- Actively contributed to code development for obtaining gravitational observables of neutron stars to higher order spins.

Teaching Assistant, University Physics: Mechanics **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *January 2024 - May 2024*

- Led weekly discussion sections of 24 students, delivering mini-lectures, guiding collaborative problem-solving, and clarifying mechanics concepts.
- Developed and graded weekly quizzes to evaluate student understanding and provide detailed feedback.
- Offered weekly office hours to address student questions and difficulties.

Research Assistant **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *May 2023 - December 2023*

- Actively contributed to code development for obtaining gravitational observables of neutron stars in the MUSES Collaboration Cyberinfrastructure Project.
- Conducted studies on the Hartle-Thorne approximation up to third order in spin of a neutron star.

Teaching Assistant, Classical Mechanics II **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *January 2023 - May 2023*

- Offered assistance as a grader of homework assignments and exams for 41 undergraduate students.
- Provided office hours weekly to the class.

Research Assistant **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *August 2022 - December 2022*

- Worked on code developing to compute gravitational neutron star observables within the MUSES project.
- Studied Hartle-Thorne approximation method up to second order in spin of a neutron star.

Laboratory Teaching Assistant, Quantum Physics **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *June 2022 - July 2022*

- Taught and grade laboratory section of the course to 8 students during the summer period.
- Provided office hours weekly to the class.

Teaching Assistant, Quantum Mechanics II **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *January 2022 - May 2022*

- Offered assistance as a grader of homework assignments and exams for 40 undergraduate students.
- Provided office hours weekly to the class.
- Developed solutions for homework assignments and exams.

Teaching Assistant, Electromagnetic Fields I **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *August 2021 - December 2021*

- Offered assistance as a grader of homework assignments and exams for 80 undergraduate students.
- Provided office hours weekly to the class.

Lecturer, Astronomy for Everyone **Bogotá, Colombia**
National University of Colombia, National Astronomical Observatory *February 2020 - August 2021*

- Taught two-hours long lectures twice a week for two full undergraduate semester courses of 50 students.
- Developed complete syllabus of the course, produced engaging content, workshops, exams and presentations.
- Explained relevant topics such as positioning astronomy, the solar system, stars, black holes and galaxies.

Lecturer, Astrophysical Objects **Bogotá, Colombia**
National University of Colombia, National Astronomical Observatory *August 2018 - July 2019*

- Taught two-hours long lectures twice a week for two full undergraduate semester courses of 50 students.
- Developed complete syllabus of the course, produced engaging content, workshops, exams and presentations.
- Explained relevant topics such as spherical astronomy, Kepler's Law, stellar evolution, black holes and

galaxies.

Teaching Assistant, Black Holes and Time Machines **Bogotá, Colombia**
National University of Colombia, National Astronomical Observatory *January 2017 - May 2017*

- Developed question banks for assignments and quices.
- Provided guidance and academical reinforcement to the students of the class.
- Offered support and assistance to professor's duties in the development of the course.

HONOURS AND AWARDS

- Ranked Excellent Teacher by Students, PHYS 211 (University Physics: Mechanics), Spring 2025.
- Ranked Excellent Teacher by Students, PHYS 211 (University Physics: Mechanics), Spring 2024.
- Laureate thesis award. Highest honour bestowed for outstanding research work. Master degree in Astronomy. National University of Colombia, 2020.
- Teaching fellowship. National Astronomical Observatory, National University of Colombia, 2018-2019.
- Undergraduate teaching assistantship. National University of Colombia, 2017.

GRANTS

"National funding call for research projects and artistic creation of the National University of Colombia 2017-2018". Code 41673. Project title: *Gravitational radiation from the inspiral of compact binaries based on a Yukawa-type addition to the Newtonian potential.*

PUBLICATIONS

- Cruz-Camacho, N., Conde-Ocazionez, C., Dexheimer, V., Noronha-Hostler, J., & Yunes, N., "Sensitivity of neutron star observables to microscopic nuclear parameters of realistic equations of state," arXiv:2603.16019 (2026).
- Conde-Ocazionez, C., Yin, T., Noronha-Hostler, J., & Yunes, N., "Highly-accurate neutron star modeling in the Hartle-Thorne approximation," *Physical Review D* **112**, 044063 (2025), arXiv:2505.19400.
- Reinke Pelicer, M., et al., "Building neutron stars with the MUSES calculation engine," *Physical Review D* **111**, 103037 (2025), arXiv:2502.07902.
- Kumar, R., et al. (MUSES Collaboration), "Theoretical and experimental constraints for the equation of state of dense and hot matter," *Living Reviews in Relativity* **27**, 3 (2024), arXiv:2303.17021.
- Conde, C., Galvis, C., & Larrañaga, E., "Properties of the innermost stable circular orbit of a spinning particle moving in a rotating Maxwell-dilaton black hole background," *Physical Review D* **99**, 104059 (2019), arXiv:1905.01323.
- Conde, C., Galvis, C., & Larrañaga, E., "On the properties of a static and a stationary charged black hole in $f(R)$ gravity," arXiv:1907.01050 (2019).

PRESENTATIONS

Seminar Yunes' Group Meeting **Urbana-Champaign, USA**
Illinois Center for Advanced Studies of the Universe *September 29 & October 6, 2025*

- C. Conde-Ocazionez. *"xAct Tutorial".*

MUSES Collaboration Meeting **Urbana-Champaign, USA**

Illinois Center for Advanced Studies of the Universe *May 28, 2025*

- C. Conde-Ocazionez & Cruz-Camacho, N. *"MUSES Workflow Demonstration".*

Seminar Yunes' Group Meeting **Urbana-Champaign, USA**
Illinois Center for Advanced Studies of the Universe *February 17 & February 24, 2025*

- C. Conde-Ocazionez, Yin, T. & Yunes, N. *"Research Overview: Accurate neutron star models in the Hartle-Thorne approach".*

APS Global Physics Summit **Anaheim, USA**
Anaheim Marriott *March 18, 2025*

- C. Conde-Ocazionez, Yin, T. & Yunes, N. *"Accurate neutron star models in the Hartle-Thorne approximation".*

34th Midwest Relativity Meeting **Ann Harbor, USA**
University of Michigan *November 16, 2024*

- C. Conde-Ocazionez, Yin, T. & Yunes, N. *"Accurate neutron star models in the Hartle-Thorne approach".*

MUSES Collaboration Meeting **Urbana-Champaign, USA**
Illinois Center for Advanced Studies of the Universe *May 15, 2024*

- C. Conde-Ocazionez, & Yunes, N. *"Expected features of the QLIMR module for the alpha release".*

APS April Meeting **Sacramento, USA**
SAFE Credit Union Convention Center *April 3, 2024*

- C. Conde-Ocazionez, & Yunes, N. *"Highly-accurate Neutron Star Solutions in the Hartle-Thorne Approximation".*

MUSES Collaboration Meeting **Urbana-Champaign, USA**
Illinois Center for Advanced Studies of the Universe *April 28, 2023*

- C. Conde-Ocazionez, Tan, H & Yunes, N. *"QLIMR Module".*

AstroFest **Urbana-Champaign, USA**
National Center for Supercomputing Applications *April 28, 2023*

- C. Conde-Ocazionez, Tan, H & Yunes, N. *"Gravitational neutron star observables code within the MUSES collaboration".*

The Fourth Zeldovich Virtual Meeting **Minsk, Belarus**
ICRANet, NAS of Belarus & Belarusian State University *September 7 - September 11, 2020*

- Larranaga, E & C. Conde-Ocazionez. *"A toy model to calculate the gravitational radiation waveform produced by a particle plunging into a static spherically symmetric black bole in massive gravity".*

14th International Conference on Gravitation, Astrophysics and Cosmology **Jhongli, Taiwan**
APCTP, National Central University *August 17 - August 21, 2020*

- Larranaga, E & C. Conde-Ocazionez. *"A toy model to calculate the gravitational radiation waveform produced by a particle plunging into a static spherically symmetric black bole in massive gravity".*

COMPLEMENTARY EDUCATION

The ICASU Inaugural Conference **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *May 19 - May 21, 2022*

- Attended to talks about cosmology, gravity, high energy and nuclear physics.

MUSES Collaboration Meeting **Urbana-Champaign, USA**
University of Illinois Urbana-Champaign *May 9 - May 11, 2022*

- Attended to module talks as a member of the Modular Unified Solver of the Equation of State project.

Physics and Astrophysics of Gravitational Waves **Bad Honnef, Germany**
Physikzentrum *September 8 - September 13, 2019*

- Attended to the school lectures including members of VIRGO and LIGO scientific collaboration.
- Solved and discussed proposed exercises during the workshop sessions with other participants and professors.

The Sound of Space-time: The Dawn of Gravitational Wave Science **São Paulo, Brazil**
ICTP (SAIFR), São Paulo State University (UNESP) *November 26 - December 14, 2018*

- Participated in three lectures per day and one workshop at the end of each day during the three school weeks.
- Received training about the theoretical aspects, data analysis and computational methods of gravitational waves astronomy by solving and discussing different kind of work assignments.

Dublin School on Gravitational Wave Source Modelling **Dublin, Ireland**
University College Dublin *June 11 - June 22, 2018*

- Attended lectures focused on source modelling and the interpretation of signals that will be detected by LISA.
- Computed problem solutions using theoretical, numerical and data analysis techniques during workshops.

Short-term Internship **Medellín, Colombia**
University of Antioquia *May 07 - May 11, 2018*

- Presented an introduction to the theory of gravitational waves in curved background spacetimes in a seminar talk.
- Attended and discussed in the two seminars exhibited by recognized international researchers.

TECHNICAL SKILLS

- Programming languages and mathematical packages: C, C++, Python, Docker, Maple, Mathematica.
- Other: Latex, Microsoft Office, Inkscape, Linux, Mac OS, Windows OS.

LANGUAGES

Spanish: Native English: Proficient Portuguese: Intermediate

REFERENCES

Available upon request.