

# Nicolás Garavito-Camargo – Curriculum Vitae

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Flatiron Research Fellow | [Center for Computational Astrophysics \(CCA\)](#), NYC  
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**Research Interests:** *Galactic Dynamics – Astrophysical probes of Dark Matter – Computational Methods – High-Performance Computing – N-body Simulations – Software development*

## Education

**Ph.D.**, Astronomy and Astrophysics, [University of Arizona](#), 2021.

Advisor: [Dr. Gurtina Besla](#)

**M.Sc.**, Physics, [Universidad de Los Andes](#), Bogotá, Colombia, 2015.

Advisor: [Dr. Jaime E. Forero-Romero](#)

**B.Sc.**, Physics, [Universidad Nacional de Colombia](#), Bogotá, Colombia, 2013.

Advisor: [Dr. Rigoberto A. Casas Miranda](#)

## Appointment

Flatiron Research Fellow, Flatiron Institute, October 2021-September 2024.

## Scholarships and Awards

- University of Arizona, Theoretical Astrophysics Program, Graduate Student Research Prize 2021.
- University of Arizona College of Science award for Excellence in Service for graduate students, 2020. (*Awarded to one graduate student across the college of science per year.*)
- University of Arizona theory travel grant, 2016, 2018.
- McCarthy-Stoeger Scholarship 2015-2017, Vatican Observatory.

## Students supervision

Total students advised or co-advised 7; 4 Ph.D, 3 undergraduates.

- Elise Darragh-Ford (Graduate student at Stanford); Fall 2023-present. I am currently advising Elise in one research project which will be the last chapter of Elise's PhD thesis. Paper in prep.
- Silvio Varela (Graduate student at Universidad de la Serena); Fall 2022-present. I am currently co-advising Silvio in one research project. Paper in prep.
- Arpit Arora (Graduate student at University of Pennsylvania); Fall 2021-present. I am currently co-advising Arpit Arora in two research projects, one paper is submitted to ApJ and one is in prep.
- Hayden Foote (Graduate student at University of Arizona); Fall 2021 - present. I co-advised Hayden in a research project that resulted in a submitted publication and one other is in prep.
- Andrew Eden (Undergraduate at Florida Institute of Technology); Fall 2022-present. I am currently advising Andrew on his undergraduate thesis project. One paper is in prep.
- Ludia Adhikary (Undergraduate CUNY); co-supervised with Emily Cunningham. Through the AstroCOM CUNY/CCA program; NYC Summer 2022-Summer 2023.
- Stephanie Carolina Cely Rodriguez (Undergraduate at Universidad Nacional de Colombia); co-advising undergraduate thesis; Summer 2022-Summer 2023.

## Teaching Experience

Principal lecturer of 3 courses thought for a total of 12 times. Teaching assistant for 3 courses.

- Guest Lecturer for the graduate Galaxies class, Columbia University, Fall 2022.
- Teaching assistant for the Astronomy Tutoring for Majors & Minors Program. University of Arizona, Spring 2019.
- Teaching assistant for the Computational Physics class PHYS305. University of Arizona. Spring 2018.
- 3 times Lecturer of the [Computational Tools](#) at Universidad de los Andes, spring semester 2014 - spring 2015.
- 3 times Lecturer of the computational Methods Laboratory at Universidad de los Andes, semester spring 2014 - spring 2015.
- Teaching assistant of the [Computational Methods](#) Universidad de los Andes, fall semester 2014.
- Lecturer (for 3 different sessions) of the class Physics I Laboratory at Universidad de los Andes, fall semester 2013.

## Academic Service:

- Local and Science organizing committee of the [Milky Clouds over Manhattan conference](#).
- PhD. thesis committee of Dr. Silvio Varela (University of La Serena, Chile), Nov-2023.
- Referee for: Astrophysical Journal (ApJ), Monthly Notices of the Royal Astronomical Society (MNRAS), Nature, Nature Astronomy, Galaxies Journal.
- Beyond-BFE collaboration coordinator: I lead the cosmological simulation group, organize in person and online meetings.
- Mentor at the City University of New York CUNY-CCA program for undergraduate students at CUNY working with mentors at the CCA, summer 2022.
- Proposal reviewer for [Colombian Science Clubs](#), 2018.
- Local Organizing Committee of the [Andean Cosmology School](#), Universidad de Los Andes, 2015.
- Organizer of the student astronomy seminar at the Planetarium of Bogotá, 2014-2015.

## Open source and HPC experience:

- Core developer and active contributor of: [py-Ananke](#), [gala](#), EXPtools, NBA, Cranes.
- Expertise running HPC codes: Gadget-3, 4, EXP (CPU & GPU), AREPO.

## Scientific Talks:

47 Total: 18 Invited (denoted by †), 26 in North America, 6 in Europe, 9 in Latin America, 1 Asia.

## Conferences (14)

- Surveying the Milky Way: The Universe at our backyard. Caltech, Pasadena, October, 2023.
- Friends of Friends meeting, Cordoba, Argentina, April, 2023. †
- IAU 379: Dynamical masses of local group galaxies, contributed talk, March, 2023.
- [IAU 377: Early Disk-Galaxy Formation from JWST to the Milky Way](#), contributed talk, February, 2023.
- [Colombian Congress of Astronomy](#), Plenary talk, August, 2022. †
- [Friends of friends meeting](#), Cordoba, Argentina, April, 2022.
- [Division on Dynamics Astronomy](#), Virtual meeting, May 2021.

- [Streams 21](#), Virtual Conference, February 2021.
- [The Local Group: Assembly and Evolution](#), virtual conference, August 2020.
- [European Astronomical Society meeting](#), virtual meeting, June 2020.
- Durham University, UK, [Small Galaxies Cosmic Questions](#), August, 2019.
- MPA, Heidelberg, [Stellar halos across the cosmos](#), July 2018.
- LARIM, Cartagena, Colombia, October 2016.
- EWASS, Geneva, Switzerland, July 2014.

## Seminars (33)

- UC Riverside, seminar, October 2023. †
- Universidad de La Serena, La Serena, Chile, May 2023. †
- Instituto de Astronomía y Física del Espacio (IAFE), Buenos Aires, April, 2023.
- Max Planck Institute for Astrophysics, Cosmology Seminar, March, 2023.
- U. Rutgers, Astronomy Seminar, Nov, 2022. †
- U. Columbia, Lunch talk, Sept, 2022. †
- STScI, galaxies lunch talk, May, 2022. †
- Universidad de Antioquia, seminar, February, 2022. †
- University of Massachusetts, Amherst, Colloquium, Jan, 2022. †
- University of Madison-Wisconsin, Science seminar, November 2021.†
- University of Michigan, Galaxies group seminar, November 2021.†
- NYU, CCPP, seminar, November 2021.†
- CCA, Flatiron Institute, Lunch Talk, October, 2021.
- Steward Observatory, Theoretical Astrophysics Program (TAP) colloquium, September, 2021.†
- [ComSciCon](#), June 2021. †.
- Steward Observatory, Galaxy lunch talk, March, 2021.
- Univesidad de los Andes, Astronomy Seminar, February, 2021.
- UC Irvine, Astronomy Seminar, January, 2021. †
- Steward Observatory, Early Career Scientist talk, December, 2020. †
- CCAPP, Seminar, December, 2020. †
- Princeton, Journal Club, November 2020. †
- KIPAC, Stanford, Tea-Talk, October 2020.
- Harvard Center for Astrophysics, GCSP seminar, October 2020.
- Carnegie Observatories, seminar, October 2020. †
- University of California Berkeley, lunch talk, September 2020.
- The Royal Observatory of Edinburgh, UK, Coffee Talk, August 2019. †
- W.M. Keck Observatory, Journal Club, June 2019.
- Magellanic Cloud Fest III, University of Arizona, May, 2019.
- JILA Seminar, JILA Institute, University of Colorado, December 2017.
- STScI Galaxies Journal Club. December 2016.
- Magellanic Cloud Fest II, University of Arizona, March 2016.
- UNAM, Mexico City, Mexico, Nov 2013.
- Centro de Investigaciones De Astronomía CIDA, Merida, Venezuela, July 2013.

†Invited

## Posters

- European Astronomical Society meeting, virtual meeting, June 2020.
- Rediscovering our Galaxy, IAU symposium 334, Potsdam, Germany. July 2017.

## Telescope and HPC time Awarded

- Hubble Space Telescope, 32 orbits, Cycle 31, 2023. PI: Sukanya Chakrabarti.
- MareNostrum Super computer, 1.7 million CPU hours, AECT-2023-2-0016, 2023. PI: Dr. Chervin Laporte.
- GMRT 60 hours cycle 44, 2023. PI: Karin Menendez-Delmestre.
- Blanco Telescope, “ *A VISTA-DECam Experiment in Near-Field Cosmology: Search for the Magellanic Dark Matter Wake*” cycle 2020B. PI: Julio Chaname, 3 nights.

## Grants

- LSSTC Grant Award #2021-51, 2001. PI: Andres A. Plazas Malagón
- IAU OAD grand.
- University of Arizona theory travel grant, 2016, 2018.
- IAU travel grant.2016.

## Observing Experience

- DECam, Blanco-4m telescope, CTIO, Chile. 3 nights, 2020.
- VATT telescope. Mt Graham, Arizona - 4 nights, 2016.
- CIDA, Merida, Venezuela - 2 nights, 2013.

## Diversity, Equity, Inclusion (DEI) and outreach:

### DEI Leadership:

- Co-creator of the 10-week [RECA internship program](#) for astronomy students in Colombia. May-August 2021.
- Co-creator of the [RECA mentorship program](#) for astronomy students in Colombia. 2020-present. (The mentorship program pairs up students with professional astronomers to provide guidance through the application process to graduate programs)
- Co-organizer, [Diversity Journal Club](#) Steward Observatory, 2018-2021.
- Creator, [Astrocharlas](#), Steward Observatory, 2018-present. (Spanish outreach series talks in astronomy)
- Writer for [Astrobitos](#), 2018-present.
- Mentor, Tucson Initiative for Minority Engagement in Science and Technology Program [TIMESTEP](#), 2016-2018.

### Outreach

- Classroom astronomer, NOAO Project [ASTRO](#), 2018-2019.
- Discussion leader, NOAO [Teen Astronomy Cafe](#), 2018.
- Planetarium SpaceArt mentor for Children, Bogotá, Colombia, 2013-2014.

## Research highlights in the news

- Sky & Telescope: How our largest dwarf galaxy keeps other in line
- JPL Nasa: Astronomers Release New All-Sky Map of Milky Way's Outer Reaches
- Syfy Wire: Dark Matter could be powering a galaxy that orbits the Milky Way until they collide
- Astrobites:
- Phys.org: Astronomers release new all-sky map of the Milky Way's outer reaches
- University of Arizona news: Astrophysicist help chart dark matters invisible ocean
- AAS NOVA 2020: An Asymmetric Dark Matter Halo
- AAS NOVA 2019: Hunting for a Dark Matter Wake

## Publications list

ORCID, ADS, arXiv

refereed: 23 – first author: 5 – Student lead: 1 (denoted by †) –  $h$ -index: 11 – citations : 831 (as of Jan 15th/2023)

23. *Generating synthetic star catalogs from simulated data1 for next-gen observatories with py-ananke*  
Adrien C. R. Thob, Robyn E. Sanderson, Andrew P. Eden, Farnik Nikakhtar, Nondh Panithanpaisal, **Nicolás Garavito-Camargo**, and Sanjib Sharma (Submitted to JOSS 2023).
22. *Dark matter distribution in Milky Way-analog galaxies*  
Natanael Gomes-Oliveira, K. Menéndez-Delmestre, T. S. Gonçalves, D. C. Rodrigues, M. Grossi, **N. Garavito-Camargo**, A. Araújo, P. P. B. Beaklini, Y. Cavalcante-Coelho, A. Cortesi, L. H. Quiroga-Núñez, T. Randriamampandry (ApJ submitted 2023).
21. *LMC-driven anisotropic boosts in stream-subhalo interactions* †  
Arora, A., **Garavito-Camargo, N.**, Sanderson, R. E., Cunningham, E. C., Wetzel, A., Panithanpaisal, N., Barry, M. (ApJ submitted 2023).
20. *The proto-galaxy of Milky Way-mass haloes in the FIRE simulation*  
Horta, Danny; Cunningham, Emily C.; Sanderson, Robyn; Johnston, Kathryn V.; Deason, Alis; Wetzel, Andrew; McCluskey, Fiona; **Garavito-Camargo, Nicolás**; Necib, Lina; Faucher-Giguère, Claude-André ; Arora, Arpit ; Gandhi, Pratik J. (ApJ Submitted 2023)
19. *Galactoseismology in cosmological simulations: Vertical perturbations by dark matter, satellite galaxies and gas.* Garcia-Conde. B, Antoja. T, Roca-Fabrega. S, Gómez. G, Ramos. P., **Garavito-Camargo. N**, Gómez-Flechoso, MA. (accepted for publication in MNRAS 2023)
18. *On the co-rotation of Milky Way satellites: LMC-mass satellites induce apparent motions in outer halo tracers*  
**Nicolás Garavito-Camargo**, Adrian M. Price-Whelan , Emily C. Cunningham, Jenna Samuel, Ekta Patel, Andrew Wetzel, Kathryn V. Johnston, Arpit Arora, Robyn E. Sanderson, Lehman Garrison, and Danny Horta (submitted 2023)
17. *Structure, Kinematics, and Observability of the Large Magellanic Cloud's Dynamical Friction Wake in Cold vs. Fuzzy Dark Matter*  
Hayden R. Foote, Gurtina Besla, Philip Mocz, **Nicolás Garavito-Camargo**, Lachlan Lancaster, Martin Sparre, Emily C. Cunningham, Mark Vogelsberger, Facundo A. Gómez , and Chervin F. P. Laporte, ApJ submitted 2023

16. *The impact of the Large Magellanic Cloud on dark matter direct detection signals*  
Smith-Orlik, Adam ; Ronaghi, Nima ; Bozorgnia, Nassim ; Cautun, Marius ; Fattahi, Azadeh ; Besla, Gurtina ; Frenk, Carlos S. ; **Garavito-Camargo, Nicolás** ; Gómez, Facundo A. ; Grand, Robert J. J. ; Marinacci, Federico ; Peter, Annika H. G. JCAP submitted 2023
15. *Lopsided Galaxies in a cosmological context: a new galaxy-halo connection*  
Silvio Varela-Lavin, Facundo A. Gómez, Patricia B. Tissera, Gurtina Besla, **Nicolás, Garavito-Camargo**, Federico Marinacci. Submitted to MNRAS 2022.
14. *On the stability of tidal streams in action space*  
Arpit Arora, Robyn E. Sanderson, Nondh Panithanpaisal, Emily C. Cunningham, Andrew Wetzel, **Nicolás Garavito-Camargo**. ApJ 1, vol. 939, no. 1, (2022).
13. *Implications of the Milky Way travel velocity for dynamical mass estimates of the Local Group*  
Katie Chamberlain, Adrian M. Price-Whelan, Gurtina Besla, Emily C. Cunningham, **Nicolás Garavito-Camargo**, Jorge Peñarrubia, Michael S. Petersen. ApJ (2022)
12. *The Clustering of Orbital Poles Induced by the LMC: Hints for the Origin of Planes of Satellites*  
**Garavito-Camargo, Nicolás**; Patel, Ekta; Besla, Gurtina; Price-Whelan, Adrian; Laporte, Chervin; Gómez, Facundo A; Kathryn V. Johnston; ApJ in press (2021).
11. *Detection of the All-Sky Response of the Galactic Halo to the Magellanic Clouds*  
Conroy, Charlie; Naidu, Rohan P; **Garavito-Camargo, Nicolás**; Besla, Gurtina; et al. Nature (2021).
10. *Quantifying the impact of the Large Magellanic Cloud on the structure of the Milky Way's dark matter halo using Basis Function Expansions*  
**Garavito-Camargo, Nicolás**; Besla, Gurtina; Laporte, Chervin; Price-Whelan, Adrian M.; et al. ApJ, 919, 109, (2021).
9. *Quantifying the Stellar Halo's Response to the LMC's Infall with Spherical Harmonics.*  
Cunningham, Emily C; **Garavito-Camargo, Nicolas**, Deason, Alis J; Johnston, Kathryn V. et al. ApJ, 898, 1,(2020).
8. *The orbital histories of Magellanic Satellites Using Gaia DR2 proper motions.*  
Patel, Ekta; Kallivayalil, Nitya; **Garavito-Camargo, Nicolas** et. al., ApJ 893, 121, (2020).
7. *The highest-speed local dark matter particles come from the Large Magellanic Cloud.*  
Besla, Gurtina; Peter, Annika; **Garavito-Camargo, Nicolas**. JCAP, 11, 13, (2019).
6. *Hunting for the DM Wake induced by the LMC.*  
**Garavito-Camargo, Nicolas**; Besla, Gurtina; Laporte, Chervin F.P; Johnston, Kathryn V; Gómez, Facundo A; Watkins, Laura. ApJ Accepted, (2019).
5. *The influence of Sagittarius and the Large Magellanic Cloud on the stellar disc of the Milky Way Galaxy.*  
Laporte, Chervin F. P; Johnston, Kathryn V; Gómez, Facundo A; **Garavito-Camargo, Nicolas**; Besla, Gurtina. MNRAS, 481, 286L, (2018).
4. *The Extremely Luminous Quasar Survey in the Sloan Digital Sky Survey Footprint. II. The North Galactic Cap Sample.*  
Schindler, Jan-Torge; Fan, Xiaohui; McGreer, Ian D; Yang, Jinyi; Wang, Feige; Green, Richard; **Garavito-Camargo, Nicolas** et al., ApJ, 863, 144S, (2018).
3. *Modelling the gas kinematics of an atypical Ly $\alpha$  emitting compact dwarf galaxy.*  
Forero-Romero, Jaime E., Gronke, Max., Remolina-Gutiérrez, Maria Camila, **Garavito-Camargo, Nicolas**, Dijkstra M. MNRAS, 474, 12F, (2018).

2. *Response of the Milky Way's disc to the Large Magellanic Cloud in a first infall scenario.*  
Laporte, C.; Gomez, F; Besla, Gurtina; Johnston, Kathryn V; & **Garavito-Camargo, Nicolas**. MNRAS, 473, 1218L, (2018).
1. *The impact of gas bulk rotation on the morphology of the Lyman-alpha line.*  
**Garavito-Camargo, J.N**; Forero-Romero J.E; Dijkstra M. ApJ, 795, 120, (2014).

## White papers

3. *NANCY: Next-generation All-sky Near-infrared Community survey* Y Jiwon Jesse Han, et al. (incl. **Garavito-Camargo, N**). [call for white papers for the Roman Core Community Survey](#)
2. *Mass Spectroscopy of the Milky Way*  
Dey, Arjun. et al., (incl. **Garavito-Camargo, N**). [Astro2020: Decadal Survey on Astronomy and Astrophysics, Vol. 51, Issue 3, id. 489 \(2019\).](#)
1. *The Multidimensional Milky Way.*  
Sanderson, Robyn E .et al. (incl. **Garavito-Camargo**) 2019. [Astro2020: Decadal Survey on Astronomy and Astrophysics, 2019, Vol. 51, Issue 3, id. 347 \(2019\).](#)