

Curriculum Vitae

Victor Hugo Robles

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<https://pages.github.rpi.edu/roblev/vrobles/>

Research Interests

Dark matter nature, origin and constraints from astrophysics and astronomical surveys
Cosmological hydrodynamics simulations of galaxies beyond the standard CDM model
Formation of the Local Group, Milky Way satellites, and dwarf galaxies

Education

Bachelor's Degree in Physics and Mathematics from IPN, Mexico 2005-2009

Master's Degree in Physics from CINVESTAV IPN México D.F, 2009-2011
Advisor Tonatiuh Matos Chassin
Title "Problems and Alternatives to Λ CDM"

Ph. Degree in Physics from CINVESTAV IPN México D.F. 2011-2015
Advisor Tonatiuh Matos Chassin
Title "Comparing the latest galaxy observations with current dark matter models"

Postdoctoral position in University of California, Irvine, CA, USA 2015-2019
CONACYT international postdoctoral scholarship 2015-2016
UCMEXUS-Postdoctoral Fellowship (Host: Prof. James S: Bullock) 2016-2017
McCue fellowship in Cosmology 2018-2019

Postdoctoral Research Associate in Yale University, New Haven, CT, USA 2020-2022
YCAA Postdoctoral Prize Fellowship

Assistant Professor at Rensselaer Polytechnic Institute, Troy, New York, USA 2023

A) Visiting Researcher

Visiting researcher at Kavli IPMU, Kashiwa Campus, Japan, 2023
Collaboration with Prof. Elisa Ferreira

Visiting researcher at National Taiwan University, Taiwan, 2023
Collaboration with Prof. Hsi-Yu Schive

Visiting researcher at Astronomisches Rechen-Institut (ARI), Heidelberg, Germany. 2015
Collaboration with Dr. Veronica Lora

Visiting researcher at Caltech, Pasadena, USA Collaboration with Prof. Philip Hopkins	2015
Visiting researcher at University of California, Irvine, USA Collaboration with Prof. James S. Bullock	2014

B) Teaching Experience

Rensselaer Polytechnic Institute Physics II: Electromagnetism Introduction to Astronomy and Astrophysics	Fall 2023, Spring 2024, 2025 Fall 2024
Yale Theory and Practice of Scientific Teaching course (PHYS 530) Gained Evidence-based approaches to engage students in their learning, to assess student outcomes, and to create an inclusive classroom in a semester-long course offered by the Yale Poorvu Center for Teaching and Learning	Spring 2021
Invited lecturer at Yale University in Prof. Daisuke Nagai’s undergraduate course Gravity, Astrophysics and Cosmology Course (PHYS 343 Spring 2020) Lecture topics: Dark Matter and Special Relativity	Spring 2020
Teaching Assistant, “Mathematical Methods I”, CINVESTAV IPN	Aug.-Dec. 2010
Teaching Assistant, “Statistical Physics”, CINVESTAV IPN	Aug.-Dec. 2014
Teaching Assistant, “Mathematical Methods”, CINVESTAV IPN	Jan. -Mar. 2015
Teaching Practice of English at the Teacher Training Course at the Anglo part of The Anglo Mexican Foundation, A.C.	

Awards

Rensselaer Polytechnic Institute start-up grant	2023
YCAA Postdoctoral Prize Fellowship at Yale University (Awarded Research funds of \$16k/year)	2020-2022
Member of the Mexican National System of Researchers (SNI Level I)	2019
Member of the American Astronomical Society	2019
Member of the AAS Astronomy Ambassadors program	2019
McCue fellowship in Cosmology at the University of California Irvine	2018-2019
UCMEXUS-Postdoctoral Fellowship (host university: UC Irvine)	2016-2017
Prize <i>Arturo Rosenblueth</i> 2016 for best Ph.D. thesis in Exact and Natural Sciences at the CINVESTAV IPN (Mexico)	2016
High-Performance Computing resources at San Diego Supercomputer Center, HPC@UC program (time awarded 500,000 CPU)	2016
CONACYT international postdoctoral scholarship (UC Irvine)	2015-2016
CONACYT scholarship for short visits abroad	2014/2015
CONACYT scholarship for Ph.D. in Physics	2011-2015
CONACYT scholarship for Master’s Program	2009-2011
TELMEX Foundation scholarship for excellence (best undergraduate GPA)	2006-2009

Collaboration and Leadership

Co-founder of BECDM project to study quantum effects in galaxies	Since 2017
Member of the FIRE project collaboration	Since 2017
Leading research on the nature of dark matter and implications on galaxy and structure formation.	
Collaborator in the DREAMS project (arxiv:2405.00766)	2025

Referee in the following scientific journals:

Monthly Notices of the Royal Astronomical Society (MNRAS)
Astronomy and Astrophysics (A&A)
Astrophysical Journal (ApJ)
Journal of Cosmology and Astroparticle Physics (JCAP)
Research in Astronomy and Astrophysics (RAA)
European Physical Journal C

Computational skills

Numerical:	High performance computing, N-body simulations (GIZMO, FIRE astrophysics and AREPO), data analysis.
Programming:	Python, C, Mathematica
Software:	Latex, Yt (Visualization and data analysis software), Office suite, Photoshop, HTML, CSS.
Languages:	Spanish (mother tongue), English (First Certificate in English), French (DELFB2), German (basic-A1)

Press Releases and Outreach

- A) **NASA/Chandra Press Release**
Is Dark Matter Fuzzy?
Collaboration with Tula Bernal and Tonatiuh Matos
<http://chandra.harvard.edu/blog/node/642>
- B) **Physical Review Letter highlight featured in Physics 12, s112**
How dark matter shaped the first galaxies
In collaboration with the BECDM project members
<https://physics.aps.org/articles/v12/s112>
- C) **Visualization for a press release related to Kapteyn star**
Collaboration with James Bullock and Miguel Rocha from UC Irvine and Joel Primack from University of California - Santa Cruz.
<http://ph.qmul.ac.uk/ancient-worlds-around-kapteyns-star>
<http://www.centauri-dreams.org/2014/06/04/probing-an-ancient-planetary-system/>

D) **Article in Mexican newspaper *La Jornada*** highlighting my awarded Prize *Arturo Rosenblueth* 2016

“En unos años harán falta más expertos en astronomía y astrofísica, alerta científico”, written by Jessica Xantomila.

<https://www.jornada.com.mx/2016/12/27/sociedad/031n1soc>

Public talk at Troy’s Public library on Eclipses	2023
Member of the RPI Diversity, Inclusion and Equity group (“Diversi-tea”)	2023
Member of the AAS Astronomy Ambassadors program (outreach activities aimed to engage students and the public in astronomy)	2019-present
NSF Workshop “Getting On-the-Spot Feedback from Your Audience”	2021
Member in the Yale Inclusion, Diversity, and Equity in Astronomy Journal Club	2021
Outreach talks to middle school: “Centro Educativo Nuevo Amanecer”, CDMX	2019
Outreach talks to middle school: “Jean Piaget college”, Mexico	2019
Astronomy Outreach at UCI	2017

Selected Publications

- 1) “Scalar Field Dark Matter: Impact of Supernovae-driven blowouts on the soliton structure of low mass dark matter halos”, **Victor H. Robles**, J. L. Zagorac, N. Padmanabhan, 2024, MNRAS , 532, Issue 2, 1980–1990
- 2) “Cosmological structure formation and soliton phase transition in fuzzy dark matter with axion self-interactions”, Philip Mocz, Anastasia Fialkov, Mark Vogelsberger, Michael Boylan-Kolchin, Pierre-Henri Chavanis, Mustafa A. Amin, Sownak Bose, Tibor Dome, Lars Hernquist, Lachlan Lancaster, Matthew Notis, Connor Painter, **Victor H. Robles**, Jesus Zavala, 2023, MNRAS, 521, Issue 2, 2608
- 3) “On the Dynamical Heating of Dwarf Galaxies in a Fuzzy Dark Matter Halo”, Dhruba Dutta Chowdhury, Frank C. van den Bosch, Pieter van Dokkum, **Victor Robles**, Hsi-Yu Schive, Tzihong Chiueh, 2023, ApJ, 949, 6
- 4) “On the Random Motion of Nuclear Objects in a Fuzzy Dark Matter Halo”, Dhruba D. Chowdhury, Frank C. van den Bosch, **Victor H. Robles**, Pieter van Dokkum, Hsi-Yu Schive, Tzihong Chiueh, Tom Broadhurst, 2021, ApJ, 916, 27
- 5) “Formation with BECDM-II. Cosmic filaments and first galaxies” Philip Mocz, Anastasia Fialkov, Mark Vogelsberger, Fernando Becerra, Xuejian Shen, **Victor H. Robles**, Mustafa A. Amin, Jesús Zavala, Michael Boylan-Kolchin, Sownak Bose, Federico Marinacci, Pierre-Henri Chavanis, Lachlan Lancaster, and Lars Hernquist, 2020, MNRAS, 494, Issue 2, 2027-2044
- 6) “First Star-forming structures in Fuzzy cosmic filaments” Philip Mocz, Anastasia Fialkov, Mark Vogelsberger, Fernando Becerra, Mustafa A. Amin, Sownak Bose, Michael Boylan-Kolchin, Pierre-Henri Chavanis, Lars Hernquist, Lachlan Lancaster, Federico Marinacci, **Victor H. Robles**, and Jesús Zavala, 2019, PRL, 123, 141301

- 7) “The Milky Way's Halo and Subhaloes in Self Interacting Dark Matter”, **Victor H. Robles**, J. S. Bullock, T. Kelley, M. Kaplinghat, 2019, MNRAS, 490, Issue 2, 2117-2123
- 8) “Dwarf Galaxies in CDM, WDM, and SIDM: Disentangling Baryons and Dark Matter Physics”, Alex Fitts, M. Boylan-Kolchin, B. Bozek, J. S. Bullock, A. Graus, **Victor H. Robles**, P. F. Hopkins, K. El-Badry, S. Garrison-Kimmel, 2019, MNRAS, 490, Issue 1, 962-977
- 9) “Scalar Field Dark Matter: Helping or Hurting Small-Scale Problems in Cosmology? **Victor H. Robles**, J. S. Bullock, M. Boylan-Kolchin, 2018, MNRAS, 483, Issue 1, 289-298
- 10) “SIDM on FIRE: Hydrodynamical Self-Interacting Dark Matter simulations of low mass dwarf galaxies” **Victor H. Robles**, J. S. Bullock, O. D. Elbert, A. Fitts, A. González-Samaniego, M. Boylan-Kolchin, P. F. Hopkins, C.-A. Faucher-Giguère, D. Kereš, C.C.Hayward, 2017, MNRAS, 472, Issue 3, 2945, 2017
- 11) “Galaxy Formation with BECDM: I. Turbulence and relaxation of idealised haloes”, P. Mocz, M. Vogelsberger, **Victor H. Robles**, J. Zavala, M. Boylan-Kolchin, A. Fialkov, and L. Hernquist, 2017, MNRAS 471, 4559–4570, 2017
- 12) “Mass discrepancy-acceleration relation: A universal maximum dark matter acceleration and implications for the ultralight scalar dark matter model” L. Arturo Ureña-López, **Victor H. Robles**, and T. Matos, 2017, Phys. Rev. D 96, 2017, 043005
- 13) “Exact Solution to Finite Temperature SFDM: Natural Cores without Feedback”, **Victor H. Robles**, T. Matos, published in Astrophys. J., 763, 2013, 19
- 14) “Flat Central Density Profile and Constant DM Surface Density in Galaxies from Scalar Field Dark Matter” **Victor H. Robles** and T. Matos, MNRAS, 422, 2012, 282-289

Professional Presentations

A) Invited Talks and Seminars

- Invited colloquium at the Rensselaer Polytechnic Institute, Troy, USA February 22, 2023
- Invited colloquium at the University of Sydney, Australia, November 10, 2022
- Invited seminar at the University of Canterbury, New Zealand, November 7, 2022
- Invited seminar at the University of Auckland, New Zealand, November 2, 2022
- Invited colloquium at the Universität Göttingen, Germany, October 27, 2022
- Invited seminar at the University of Amsterdam, Netherlands, October 25, 2022
- Invited seminar at Strasbourg Observatory, Strasbourg, France, October 19, 2022

- Invited seminar at Universidad Complutense de Madrid, Madrid, Spain, October 11, 2022
- Invited seminar at The British University in Egypt, Cairo, Egypt, October 4, 2022
- Invited talk at Tohoku University, Sendai, Japan, July 13, 2022
- Invited talk at Boston University, Boston, USA, April 4, 2022
- Invited seminar at UNAM-IA, Mexico City, Mexico, September 17, 2019
- Invited talk at KICP, Chicago, USA, August 6, 2019
- Invited seminar at Shanghai Astronomical Observatory, June 27, 2019
- Invited seminar at Caltech TAPIR, Pasadena, USA, Dec. 7, 2018.
- Invited seminar at Carnegie Observatories, Pasadena, USA, Nov. 16, 2018.
- Invited talk at Mexican Dark Matter meeting, Cancun, Mexico, Nov. 3-5, 2018.
- Invited talk at UC Riverside, CA, USA, June 12, 2018
- Astronomy Colloquium, UCSD, CA, USA, Jan. 24, 2018.
- Seminar talk at UCLA, Astronomy Department, CA, USA, Oct. 20, 2017.
- Talk at Stanford KiPAC seminar, CA, USA, Sep. 12, 2017. Talk: “Towards a deeper understanding of DM using FIRE astrophysics”
- Invited talk at the CfA Harvard-Smithsonian, Cambridge, USA, July 2016, Talk: “Setting self-Interacting dark matter on FIRE”.
- Invited talk at the CfA Harvard-Smithsonian, Cambridge, USA, March 2017, Talk: “Exploring the impact of self-interactions and ultra-light DM on the visible component at galactic scales”.
- Seminar talk in the astrophysics group at Princeton, New Jersey, USA, July 2016, “Setting self-Interacting dark matter on FIRE”.
- 66th Lindau Nobel Laureate Meeting, Lindau, Germany, June 26- July 1 2016. Invited participation.
- Invited talk in KIAS, Seoul, Korea, November 11, 2014. Title “Constraints on scalar field dark matter from cosmological observables”

B) Contributed Conference Presentations and Workshops

- APRIM 2023, Koriyama, Japan, August 7-11, “Impact of Supernova feedback in ultra-light dark matter halos”, 2023
- 25th annual International Conference on Particle Physics and Cosmology (COSMO'22), Rio de Janeiro, Brazil, August 22-26, 2022, Poster: “Identifying the dark matter nature from observations of nearby faint galaxies”
- XXXIst International Astronomical Union General Assembly (IAUGA 2022), Busan, South Korea, August-2-11, 2022, Talk: “Constraints to Dark matter nature from internal structure and orbital information of Milky Way satellites”
- From galaxies to cosmology with deep spectroscopic surveys - A tribute to Olivier Le Fèvre, Marseille, France, July 4-8, 2022, Talk: “Elucidating dark matter nature from current and future galaxy census of nearby dwarf galaxies”
- Talk at very Light DM workshop 2021, Tokyo, Japan, September 29, 2021
- 24th International Conference on Particle Physics and Cosmology, Illinois, USA, August 2-6, 2021
- AAS Astronomy Ambassadors workshop, Honolulu, Hawaii, January 3-4, 2020.

- 235th AAS meeting, Honolulu, USA, January 4-8, 2020, Talk: “An infall mass-pericenter correlation in Milky Way dwarf galaxy halos”
- IAU Symposium 353: Galactic Dynamics in the era of Large Surveys, Shanghai, June 23-July 6, 2019, Poster: “First galaxies in Scalar Field/Fuzzy dark matter”
- 2018 Santa Cruz Galaxy Workshop, Santa Cruz, USA, August 6-10, 2018, Talk: “Scalar Field Dark Matter: Predictions and Simulations”
- 2017 Santa Cruz Galaxy Workshop, Santa Cruz, USA, August 7-11, 2017, Talk: “Testing fuzzy and self-interacting DM models with simulations of dwarf galaxies”
- 13th Rencontres du Vietnam: Exploring the Dark Universe, Quy Nhon, Vietnam, July 23-29, 2017, Talk: “SIDM on FIRE: Self-Interacting Dark Matter simulations of dwarf galaxies with Feedback In Realistic Environments”
- 13th Asian-Pacific Regional IAU Meeting, Taipei, Taiwan, July 3-7, 2017, Talk: SIDM on FIRE: Self-Interacting Dark Matter simulations of dwarf galaxies with Feedback In Realistic Environments. Also Poster: “Observational consequences of ultra-light scalar field (Wave) dark matter”
- The 21st International Conference on General Relativity and Gravitation, New York, USA, July 10-15 2016. Talk: “Constraining the mysterious dark matter with recent cosmological and galactic observations”.
- European Week of Astronomy and Space Science Athens, Greece July 4-8 2016, Talks: 1) “Testing the cold dark matter model with cluster mass distribution” 2) “Using the strong lensing and the Einstein radius to infer dark matter distribution in the SFDM model”.
- The 32nd IAP Colloquium, Paris, France June 20-24 2016, Poster: “Impact of the UV background in SIDM/CDM dwarf galaxies”.
- Essential Cosmology for the Next Generation, Cancún, Mexico, January 10-16 2016.
- IAU XXIX General Assembly Honolulu, Hawaii, August 3-14 2015, Poster: “Observational consequences in galactic scales of the scalar field dark matter paradigm”.
- The 6th KIAS workshop on cosmology and structure formation. Seoul, Korea, November 3-7 2014. Talk “Dwarf galaxy observations as a test to CDM and SIDM model’s predictions”
- 11th Potsdam Thinkshop: Satellite galaxies and dwarfs in the local group, Potsdam, Germany, August 25-29, 2014, Poster “Supernova feedback in dwarf SIDM halos”
- Workshop on Cosmology from baryons at high redshift, Trieste, Italy, August 18-21 2014.
- Summer school on Cosmology, Trieste, Italy, August 4-15 2014
- 27th Texas Symposium on Relativistic Astrophysics, Dallas, USA, December 8-13, 2013, Talk: “Finite Temperature Scalar Field dark matter haloes”.
- Seventh Aegean Summer School, Paros, Greece, September 23-28. Talk: “Dark matter halos in the scalar field DM model”.
- SCALARS 2013, Warsaw, Poland, September 12-16 2013. Talk: “Rotation Curves from finite temperature scalar field dark matter”.

- Encuentros Relativistas Españoles, Benasque, Spain. September 8-12 2013. Talk: “Properties of scalar field dark matter halos”.
- International Conference on Particle Physics and Cosmology-COSMO 2013, Cambridge, UK September 2-6, 2013, Talk: “Finite Temperature Scalar Field haloes and strong gravitational lensing constrains”.
- COSMO 12, Beijing, China, September 10-14 2012. Talk “Exact Solution to finite temperature SFDM: Natural cores without feedback”.
- IAU XXVIII General Assembly session “Galaxy Evolution through secular processes”, Beijing, China, August 20-24 2012, Poster “Galaxy rotation curves from finite temperature SFDM”.
- Cosmology on the Beach 2012, Cancún, Mexico, January 16-20, 2012. Poster title: “Flat Central Density Profile and Constant DM Surface Density in Galaxies from Scalar Field Dark Matter”.
- Symposium "Symmetries and Phases in the Universe", Kloster Irsee, Germany, February 27- March 1st 2012 poster “Phase transition of the Scalar Field Dark Matter model and its hydrodynamical evolution equation.”