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Research Interests

- Large scale probes for testing dark energy and modified gravity.
- Measurements of baryon acoustic oscillations and large-scale-structure using galaxy surveys.
- Data analysis techniques, statistical inference, tension metrics, non-parametric methods and agnostic tests.

Education

2020 – May 2024 **The University of Texas at Dallas**
Ph.D. in Physics.
Advisor: *Dr. Mustapha Ishak-Boushaki*.

2018 – 2020 **The University of Texas at Dallas**
Master of Science in Physics.
Advisor: *Dr. Mustapha Ishak-Boushaki*.

2012 – 2017 **Universidad Autónoma de Sinaloa** (Mexico)
Bachelor of Science in Physics
Advisor: *Dr. Juan Antonio Nieto Garcia*.

Publications

Peer-reviewed publications

1. A. G. Adame *et al.*, "The Early Data Release of the Dark Energy Spectroscopic Instrument," *Astron. J.*, vol. 168, no. 2, p. 58, 2024. DOI: 10.3847/1538-3881/ad3217. arXiv: 2306.06308 [astro-ph.CO].

2. A. G. Adame *et al.*, "Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument," *Astron. J.*, vol. 167, no. 2, p. 62, 2024. DOI: 10.3847/1538-3881/ad0b08. arXiv: 2306.06307 [astro-ph.CO].

3. B. Hadzhiyska, M. J. White, X. Chen, L. H. Garrison, J. DeRose, N. Padmanabhan, C. **Garcia-Quintero**, J. Mena-Fernández, S.-F. Chen, H.-J. Seo, P. McDonald, J. Aguilar, S. Ahlen, D. Brooks, T. Claybaugh, A. de la Macorra, P. Doel, A. Font-Ribera, J. E. Forero-Romero, S. G. A. Gontcho, K. Honscheid, A. Kremin, M. Landriau, M. Manera, R. Miquel, J. Nie, N. Palanque-Delabrouille, M. Rezaie, G. Rossi, E. Sanchez, M. Schubnell, Gregory, Tarlé, and Z. Zhou, "Mitigating the noise of DESI mocks using analytic control variates," *Open J. Astrophys.*, vol. 6, p. 2308.12343, 2023. DOI: 10.21105/astro.2308.12343. arXiv: 2308.12343 [astro-ph.CO].

4. B. Hadzhiyska, S. Yuan, C. Blake, D. J. Eisenstein, J. Aguilar, S. Ahlen, D. Brooks, T. Claybaugh, A. de la Macorra, P. Doel, N. Emas, J. E. Forero-Romero, C. **Garcia-Quintero**, M. Ishak, S. Joudaki, E. Jullo, R. Kehoe, T. Kisner, A. Kremin, A. Krolewski, M. Landriau, J. U. Lange, M. Manera, R. Miquel, J. Nie, C. Poppett, A. Porredon, G. Rossi, R. Ruggeri, C. Saulder, M. Schubnell, G. Tarlé, B. A. Weaver, E. Xhakaj, and Z. Zhou, "Synthetic light-cone catalogues of modern redshift and weak lensing surveys with abacussummit," *Monthly Notices of the Royal Astronomical Society*, vol. 525, no. 3, pp. 4367–4387, Sep. 2023, ISSN: 0035-8711. DOI: 10.1093/mnras/stad2563. eprint: https://academic.oup.com/mnras/article-pdf/525/3/4367/51709004/stad2563.pdf.

5. J. Moon, D. Valcin, M. Rashkovetskyi, C. Saulder, J. N. Aguilar, S. Ahlen, S. Alam, S. Bailey, C. Baltay, R. Blum, D. Brooks, E. Burtin, E. Chaussidon, K. Dawson, A. de la Macorra, A. de M attia, G. Dhungana, D. Eisenstein, B. Flaugher, A. Font-Ribera, J. E. Forero-Romero, C. **Garcia-Quintero**, S. Gontcho A Gontcho, J. Guy, M. M. S. Hanif, K. Honscheid, M. Ishak, R. Kehoe, S. Kim, T. Kisner, A. Kremin, M. Landriau, L. Le Guillou, M. Levi, M. Manera, P. Martini, P. McDonald, A. Meisner, R. Miquel, J. Moustakas, A. Myers, S. Nadathur, R. Neveux, J. A. Newman, J. Nie, N. Padmanabhan, N. Palanque-Delabrouille, W. Percival, A. Pérez Fernández, C. Poppett, F. Prada, A. Raichoor, A. J. Ross, G. Rossi, L. Samushia, D. Schlegel, H.-J. Seo, G. Tarlé, M. Vargas Magana, A. Variu, B. A. Weaver, M. J. White, C. Yèche, S. Yuan, C. Zhao, R. Zhou, Z. Zhou, and H. Zou, "First detection of the BAO signal from early DESI data," *Monthly Notices of the Royal Astronomical Society*, vol. 525, no. 4, pp. 5406–5422, Sep. 2023, ISSN: 0035-8711. DOI: 10.1093/mnras/stad2618. eprint: https://academic.oup.com/mnras/article-pdf/525/4/5406/51554201/stad2618.pdf.

6. R. Ruggeri, C. Blake, J. DeRose, C. **Garcia-Quintero**, B. Hadzhiyska, M. Ishak, N. Jeffrey, S. Joudaki, A. Krolewski, J. U. Lange, A. Leauthaud, A. Porredon, G. Rossi, C. Saulder, E. Xhakaj, D. Brooks, G. Dhungana, A. de la Macorra, P. Doel, S. Gontcho A Gontcho, A. Kremin, M. Landriau, R. Miquel, C. Poppett, F. Prada, G. Tarlé, and DESI Collaboration, "A data compression and optimal galaxy weights scheme for Dark Energy Spectroscopic Instrument and weak lensing datasets," *Mon. Not. R. Astron. Soc.*, Jun. 2023. DOI: 10.1093/mnras/stad1651. arXiv: 2208.01031 [astro-ph.CO].

7. DESI Collaboration, B. Abareshi, J. Aguilar, *et al.*, "Overview of the Instrumentation for the Dark Energy Spectroscopic Instrument," *Astron. J.*, vol. 164, no. 5, 207, p. 207, Nov. 2022. DOI: 10.3847/1538-3881/ac882b. arXiv: 2205.10939 [astro-ph.IM].

8. J. A. Nieto, E. A. León, and C. **Garcia-Quintero**, "Cosmological-static metric correspondence and Kruskal type solutions from symmetry transformations," *Rev. Mex. Fis.*, vol. 68, no. 4, p. 040 701, 2022. DOI: 10.31349/RevMexFis.68.040701.

9. C. **Garcia-Quintero** and M. Ishak, "Singling out modified gravity parameters and data sets reveals a dichotomy between Planck and lensing," *Mon. Not. R. Astron. Soc.*, vol. 506, no. 2, pp. 1704–1714, Sep. 2021. DOI: 10.1093/mnras/stab1773. arXiv: 2009.01189 [astro-ph.CO].

10. C. **Garcia-Quintero**, M. Ishak, and O. Ning, "Current constraints on deviations from General Relativity using binning in redshift and scale," *J. Cosmol. Astropart. Phys.*, vol. 2020, no. 12, 018, p. 018, Dec. 2020. DOI: 10.1088/1475-7516/2020/12/018. arXiv: 2010.12519 [astro-ph.CO].

11. C. **Garcia-Quintero**, A. Ortíz, and J. A. Nieto, "New reflections on higher dimensional linearized gravity," *Revista Mexicana de Física*, 2019. URL: https://doi.org/10.31349/revmexfis.65.536.

12. C. **Garcia-Quintero**, M. Ishak, L. Fox, and J. Dossett, "Testing deviations from GR at cosmological scales including dynamical dark energy, massive neutrinos, functional or binned parametrizations, and spatial curvature," *Phys. Rev. D.*, vol. 100, no. 10, 103530, p. 103 530, Nov. 2019. DOI: 10.1103/PhysRevD.100.103530. arXiv: 1908.00290 [astro-ph.CO].

13. C. **Garcia-Quintero**, M. Ishak, L. Fox, and W. Lin, "Cosmological discordances. III. More on measure properties, large-scale-structure constraints, the Hubble constant and Planck data," *Phys. Rev. D.*, vol. 100, no. 12, 123538, p. 123 538, Dec. 2019. DOI: 10.1103/PhysRevD.100.123538. arXiv: 1910.01608 [astro-ph.CO].

Submitted publications to peer-reviewed journals

1. A. G. Adame *et al.*, "DESI 2024 III: Baryon Acoustic Oscillations from Galaxies and Quasars," Apr. 2024. arXiv: 2404.03000 [astro-ph.CO].

2. A. G. Adame *et al.*, "DESI 2024 IV: Baryon Acoustic Oscillations from the Lyman Alpha Forest," Apr. 2024. arXiv: 2404.03001 [astro-ph.CO].

3. A. G. Adame *et al.*, "DESI 2024 VI: Cosmological Constraints from the Measurements of Baryon Acoustic Oscillations," Apr. 2024. arXiv: 2404.03002 [astro-ph.CO].

4. S.-F. Chen *et al.*, "Baryon Acoustic Oscillation Theory and Modelling Systematics for the DESI 2024 results," Feb. 2024. arXiv: 2402.14070 [astro-ph.CO].
5. Z. Ding *et al.*, "Suppressing the Sample Variance of DESI-Like Galaxy Clustering with Fast Simulations," Apr. 2024. arXiv: 2404.03117 [astro-ph.CO].
6. C. **Garcia-Quintero** *et al.*, "HOD-Dependent Systematics in Emission Line Galaxies for the DESI 2024 BAO analysis," Apr. 2024. arXiv: 2404.03009 [astro-ph.CO].
7. J. U. Lange *et al.*, "Systematic Effects in Galaxy-Galaxy Lensing with DESI," Apr. 2024. arXiv: 2404.09397 [astro-ph.CO].
8. J. Mena-Fernández *et al.*, "HOD-Dependent Systematics for Luminous Red Galaxies in the DESI 2024 BAO Analysis," Apr. 2024. arXiv: 2404.03008 [astro-ph.CO].
9. E. Paillas *et al.*, "Optimal Reconstruction of Baryon Acoustic Oscillations for DESI 2024," Apr. 2024. arXiv: 2404.03005 [astro-ph.CO].
10. A. Pérez-Fernández *et al.*, "Fiducial-Cosmology-dependent systematics for the DESI 2024 BAO Analysis," Jun. 2024. arXiv: 2406.06085 [astro-ph.CO].
11. M. Rashkovetskyi *et al.*, "Semi-Analytical Covariance Matrices for Two-Point Correlation Function for DESI 2024 Data," Apr. 2024. arXiv: 2404.03007 [astro-ph.CO].
12. S. Yuan *et al.*, "Redshift evolution and covariances for joint lensing and clustering studies with DESI Y1," Mar. 2024. arXiv: 2403.00915 [astro-ph.CO].

Awards

2024- **NASA Einstein Fellowship**. Awarded as Einstein fellow as part of the NASA Hubble Fellowship Program. (25 chosen fellows from a pool of 521 applicants)

2018-2023 **Conacyt-ConTex Doctoral Fellowship**. Joint-Fellowship between The National Council of Science and Technology (CONACyT) and the ConTex program. This is a Scholarship provided by the Mexican government through CONACyT to pursue graduate education abroad, with additional benefits provided by ConTex.

2016 **U.S. embassy in Mexico; ANUIES; UT-Dallas**, Mexican summer research program. I was one of the 15 students selected from almost 400 applicants in Mexico to participate in a two months summer intership at UT-Dallas.

2015 **Mexican Academy of Science**. National summer research program award. I was funded to do undergraduate research for two month at a national institution.

Contribution to software and code development

- **Integrated-Software-in-Testing-General-Relativity (ISiTGR)**. This code is a publicly available package that is a patch to the software `CAMB` and `CosmoMC`. `ISiTGR` is intended to test deviations from general relativity at large scales using available cosmological data. A Fortran-to-Python wrapper is implemented. Currently, this code is embedded into the **Core Cosmology Library (CCL)** used by LSST-DESC, and **desilike** used by DESI. Written in Fortran and Python. The code can be found at `https://github.com/mishakb/ISiTGR`. (Co-developer)
- **BAO-Fitter**. This software is a publicly available code for fitting Baryon Acoustic Oscillation (BAO) multipoles that uses nbodykit, emcee and python functions to implement a Beutler-2017 BAO template for isotropic and anisotropic analyses. I used BAO-Fitter for previous bao mock challenge analyses in DESI. Written in Python. The code can be found at `https://github.com/gqcristhian/BAO_Fitter`. (Developer)

Contribution to software and code development (continued)

- **Core-Cosmology-Library (CCL)**. Contributed to modified gravity benchmarking of `CCL` using `ISiTGR` and modified gravity functions. The code can be found at: `https://zenodo.org/record/3520628`. (Contributor)

Talks

01/11/2024 — **The Dark Energy Spectroscopic Instrument: HOD-dependent systematics in modelling Baryon Acoustic Oscillations for Emission Line Galaxy.**
243rd Meeting of the American Astronomical Society - New Orleans, Lousiana, USA.

10/13/2023 — **The Dark Energy Spectroscopic Instrument: HOD-dependent systematics in modelling Baryon Acoustic Oscillations for Emission Line Galaxy and Modified Gravity analysis using overlapping photometric surveys.**
Fall 2023 Joint Meeting of the Texas Section of the APS, Texas Section of the AAPT & Zone 13 of the SPS - San Angelo University, USA.

10/10/2023 — **The Dark Energy Spectroscopic Instrument (DESI): HOD-dependent systematics in modelling Baryon Acoustic Oscillations for Emission Line Galaxy**
Theoretical Astroparticle and Cosmology Symposium in Texas - Rice University, USA. (Invited talk)

08/16/2023 — **Cosmology with desilike & other tools.**
1st advanced DESI workshop - UNAM, Mexico. (Virtual talk)

07/21/2023 — **Lensing mock challenge using DESI and overlapping surveys.**
DESI Winter Collaboration Meeting, Durham University, Durham, UK.

03/28/2023 — **Overview of the Galaxy-Lensing Cross-Correlations TG.**
DESI research forum. (Virtual talk)

06/24/2022 — **DESI lensing likelihood pipelines. (joint talk)**
DESI Summer Collaboration Meeting, DoubleTree Berkeley Marina Hotel, San Francisco, CA, USA.

12/08/2021 — **Lensing Mock Challenge. (joint talk)**
DESI Hybrid Collaboration Meeting. (Virtual talk)

11/14/2020 — **Current constraints on deviations from general relativity using binning in redshift and scale.**
2020 Joint Fall Meeting of the Texas Section of the APS, Texas Section of the AAPT, TX, USA. (Virtual talk)

11/18/2019 — **Modified gravity demos using the Core Cosmology Library.**
LSST-DESC collaboration sprint week meeting - Texas A&M University, TX, USA.

10/19/2018 — **Constraints on modified gravity parameters from Planck and other data sets.**
2018 Joint Fall Meeting of the Texas Section of the APS, Texas Section of the AAPT - University of Houston, TX, USA.

10/26/2016 — **Cosmological parameter constraints using observational data.**
XXIII Week of Science and Technology in Mexico - FCFM UAS, Mexico.

10/07/2015 — **Gravitational Waves: Theory and Experiment.**
Institutional Seminary - FCFC UAS, Mexico

03/04/2015 — **Time-varying cosmological term in anisotropic cosmology.**
Institutional Seminary - FCFC UAS, Mexico

Professional memberships

2020-present — Member of the Dark Energy Spectroscopic Instrument (DESI).

Professional memberships (continued)

2018-present
- Member of the LSST Dark Energy Science Collaboration (LSST-DESC).
- Member of the American Physical Society (APS).
- Member of the American Astronomical Society (AAS).

Roles and Service

2023-present
- **Co-Chair** of the Dark Energy Spectroscopic Instrument (DESI) Galaxy-Lensing Cross-Correlations Topical Group.
  My role as co-chair is to organize weekly meetings and give follow up to projects across our DESI topical group.

2022-2023
- **Member** of the Early Career Scientists (ECS) committee of the DESI collaboration.
  I volunteered to be part of the ECS committee to propose activities, provide general information and get involved in issues for the benefit of ECS in the DESI collaboration.
- **DESI Meetings Committee-ECS liaison**.
  I organized activities for Early Career Scientists (ECS) in the DESI collaboration meetings at Cancun, Mexico (2022) and at Durham, United Kingdom (2023).
  I designed and organized activities for ECS such as "job/postdoc mock interviews", various tutorial and professional guiadance panels for ECS.

January 2019
- Event assistant of the Building Astronomy in Texas Symposium.

2012-2017
- Local organizer of the outreach astronomical event "noche de las estrellas" with the Astronomical Society of Sinaloa (ASA), Mexico.
  I performed also several workshops on water rockets with ASA and Science Center of Sinaloa for general public.
  Additionally, we used to travel across different cities in my state to do "astronomical observation nights" at different institutions and universities to foster the interests for astronomy in students and families.

Research Internships

2016
- University of Texas at Dallas, U.S., with Dr. Mustapha Ishak-Boushaki. (Undergraduate)
  Project: Cosmological parameter constraints using CAMB and CosmoMC.

2015
- University of Guadalajara, Mexico, with Dr. Claudia More González. (Undergraduate)
  Project: Theoretical study of gravitational waves.

2014
- University of Guanajuato, Mexico, with Dr. Jose Socorro García Díaz. (Undergraduate)
  Project: Time-varying cosmological term in anisotropic cosmology.

Teaching Experience

Teaching assistant (Summer 2021)
- The University of Texas at Dallas. College physics II (PHYS 1302). Supervisor: Dr. Anton Malko.

Teaching Assistant (Fall 2018)
- The University of Texas at Dallas. Electromagnetism and waves (PHYS 2326). Supervisor: Dr. Russel Stoneback.

Lecturer (Spring 2018)
- Technological University of Culiacán, Mexico. Physics and math methods.

Students Supervised

Research mentor (Summer 2021)	Assisted Dr. Mustapha Ishak-Boushaki to mentor an undergraduate student (Lael Verace) in a project related to cosmological parameter estimation.
Research mentor (Summer 2020)	Assisted Dr. Mustapha Ishak-Boushaki to mentor an undergraduate student (Orion Ning) in a project related to cosmological parameter constraints and modified gravity using binning methods.

Additional Skills

Cosmological Software	Experience with parameter inference (Cobaya, Cosmosis, CosmoMC), theory calculations (CAMB, CCL), clustering calculations (pycorr, pypower), BAO related codes (Barry for parameter inference, pyrecon for reconstruction, GoFish for forecast), model comparison (MCEvidence, DIC routines), tension metrics (IOI and QUDM routines).
Programming	Python, C, Fortran.
Languages	Spanish (native), English.