André Zamorano Vitorelli

Contact Information

Caltech/Jet Propulsion Laboratory
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Education

University of São Paulo - Institute of Astronomy, Geophysics and Atmospheric Sciences

- Ph.D. in Astronomy (2019)
- M.Sc. in Astronomy (2015)

University of São Paulo - Institute of Physics

- Bachelor's degree in Physics with focus in Astronomy (2012)

Work

Jet Propulsion Laboratory (2022-)

- Galaxy shape measurement and calibration for the Euclid mission
- Multiprobe cosmology tools development
- Galaxy shape measurement pipelines for SuperBIT
- Weak lensing effects on galaxy kinematics observations
- Correlations between galaxy cluster concentrations and observables

CosmoStat - CEA Paris-Saclay/IRFU/DAp-AIM (2020-2022)

- Using Machine Learning tools for several tasks regarding weak gravitational lensing on large galaxy surveys for CFIS and Euclid
- Developing new techniques for shear measurement calibration.

IAG - USP (2020)

- Photometry optimisation for multiband surveys (S-PLUS Collaboration)
- Detection pipeline testing and adjustment (S-PLUS Collaboration)

Collaborations

J-PAS

S-PLUS

Euclid

Skills

Python, R, ADQL, and C programming

Massive parallel computing for GPUs (CUDA)

Machine Learning for scientific applications (Active Learning, CNNs)

Bayesian inference

Astronomical image analysis with SExtractor, PSFex

Galaxy image simulation for tests with GalSim

Software development management with git, GitHub, GitLab

Cosmological inference with CosmoSIS.

Galaxy shape measurements, calibration, sensitivity.

Exploration of astronomical datasets with TOPCAT, Aladin

Interests

I am currently working on fast methods for shape measurement calibration and calibration verification using metacalibration for the Euclid mission.

I am also working with multi-probe cosmology tools development, interfacing industry software development practices and science projects.

I am interested in the interplay between the history of mass assembly of galaxy clusters and how it relates to the underlying cosmology and fundamental physics.

Published Papers

Castejon, M. et al. (Oct. 2024). "Fossil groups analysis using weak gravitational lensing". In: MNRAS 534.1, pp. 852–860. doi: 10.1093/mnras/stae2078.

Redmond, Susan F. et al. (Aug. 2024). "To the stratosphere and beyond! Super-pressure balloon flight overview for the Super-pressure Balloon-borne Imaging Telescope (SuperBIT)". In: Ground-based and Airborne Telescopes X. Ed. by Heather K. Marshall, Jason Spyromilio, and Tomonori Usuda. Vol. 13094. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 130942P, 130942P. doi: 10.1117/12.3020296.

Gill, Ajay S. et al. (Aug. 2024). "SuperBIT Superpressure Flight Instrument Overview and Performance: Near-diffraction-limited Astronomical Imaging from the Stratosphere". In: ApJ 168.2, 85, p. 85. doi: 10.3847/1538-3881/ad5840

Werner, S. V.; Cypriano, E. S.; Gonzalez, A. H.; Mendes de Oliveira, C.; Araya-Araya, P.; Doubrawa, L.; Lopes de Oliveira, R.; Lopes, P. A. A.; Vitorelli, A. Z.; Brambila, D.; Costa-Duarte, M.; Telles, E.; Kanaan, A.; Ribeiro, T.; Schoenell, W.; Gonçalves, T. S.; Menéndez-Delmestre, K.; Bom, C. R.; Nakazono, L. S-PLUS DR1 galaxy clusters and groups catalogue using PzWav. In: Monthly Notices of the Royal Astronomical Society, Volume 519, Issue 2, pp.2630-2645

Costa, Leonardo V., E. S. Cypriano, C. R. de Bom, B. M. O. Fraga, A. Z. Vitorelli, and +J-PAS Collaboration (Jan. 2023). "PSF-free galaxy shape measurement methods for the J-PAS survey". In: Bulletin of the Astronomical Society of Brazil 34, pp. 145–149.

Farrens, S.; Guinot, A.; Kilbinger, M.; Liaudat, T.; Baumont, L.; Jimenez, X.; Peel, A.; Pujol, A.; Schmitz, M.; Starck, J. -L.; Vitorelli, A. Z In: Astronomy & Astrophysics, Volume 664, id.A141, 6 pp.

Farrens, S. ; Lacan, A. ; Guinot, A. ; Vitorelli, A. Z. (2021) "Deep Transfer Learning for Blended Source Identification in Galaxy Survey Data". In arXiv: 2110.08180 (accepted for publication in A&A)

Bonoli, S. et al (2021) "The miniJPAS survey: A preview of the Universe in 56 colors". In: A&A, Volume 653, id.A31, 37 pp.

Almeida-Fernandes, F. et al. (2021) "Data Release 2 of S-PLUS: accurate template-fitting based photometry covering $\sim$ 1000 square degrees in 12 optical filters". In: arXiv:2104.00020

Mendes de Oliveira, C. et al. (2019). "The Southern Photometric Local Universe Survey (S-PLUS): improved SEDs, morphologies and redshifts with 12 optical filters". In: MNRAS, 489, Issue 1, p. 2048.

Ishida, E. E. O., R. Beck, S. González-Gaitán, R. S. de Souza, A. Krone-Martins, J. W. Barrett, N. Kennamer, R. Vilalta, J. M. Burgess, B. Quint, Vitorelli, A. Z., A. Mahabal, and E. Gangler (2019). "Optimizing spectroscopic follow-up strategies for supernova photometric classification with active learning". In: MNRAS 483, Issue 1, pp. 2–18.

Monteiro-Oliveira, R., E. S. Cypriano, Vitorelli, A. Z., A. L. B. Ribeiro, L. Sodré, R. Dupke, and C. Mendes de Oliveira (2018). "New insights on the dissociative merging galaxy cluster Abell 2034". In: MNRAS 481, Issue 1, pp. 1097–1114.

Pereira, M. E. S., M. Soares-Santos, M. Makler, J. Annis, H. Lin, A. Palmese, Vitorelli, A. Z., B. Welch, G. B. Caminha, T. Erben, B. Moraes, and H. Shan (2018). "Weak-lensing calibration of a stellar mass-based mass proxy for redMaPPer and Voronoi Tessellation clusters in SDSS Stripe 82". In: MNRAS 474, Issue 1, pp. 1361–1372.

Vitorelli, A. Z., Eduardo S. Cypriano, Martín Makler, Maria E. S. Pereira, Thomas Erben, and Bruno Moraes (2018). "On mass concentrations and magnitude gaps of galaxy systems in the CS82 survey". In: MNRAS 474, Issue 1, pp. 866–875.

Academic performance

12 published papers (1 as first author), 399 citations (ADS).

$h = 8$(ADS)

Scientific Events

Congresses

- COSMO21 Chania, Greece (May 2024) Presented: Pseudaria: Map-Level Inference of Unknown Systematics in Galaxy Number Counts (2024)
- Likelihood-free in Paris (2022)
- Rencontres Moriond Presented: Autometacal: GPU metacalibration of galaxy shape measurements (2022)
- Semaine de l'Astrophysique Française 2021 - Atelier Général du PNCG: Machine Learning for the study of galaxies and cosmology Presented: Deep Learning for Blended Source Identification (2021)
- XXXth General Assembly of the International Astronomical Union. Presented: Probing the Mass Assembly of Galaxy Systems With Weak Lensing (2018)
- XLI Brazilian Astronomical Society Reunion. Presented: On mass concentrations & magnitude gaps of galaxy systems in the CS82 survey (2017)
- XL Brazilian Astronomical Society Reunion. Presented: On the Concentration of BCG Dominated Galaxy Systems in the CS82 Survey (2016)
- XXXIX Brazilian Astronomical Society Reunion. Presented: Intervalos de Magnitudes e Propriedades Físicas de Aglomerados de Galáxias (2015)
- XXXVIII Brazilian Astronomical Society Reunion. Presented: Análise de Stacking no Estudo de Intervalos de Magnitude Em Aglomerados (2014)

Schools

- Astronomy School on Photometric Redshifts - Dr. Alberto Molino (2017)
- School on Open Problems in Cosmology ICTP-SAIFR (2017)
- "Computational Cosmology: Simulating Cosmic Structures" - Prof. August Evrard - XXI Ciclo de Palestras do ON (2016)
- International Neutrino Summer School ICTP-SAIFR (2015)
- School on Gravitational Waves: from data to theory and back ICTP-SAIFR (2015)
- Workshop on Astrophysics and Relativity ICTP-SAIFR (2015)
- Minicourse on Data Analysis in Cosmology ICTP-SAIFR (2014)
- School and Workshop on Observational Cosmology ICTP-SAIFR (2014)

Collaboration Meetings

- Euclid 2024
- Euclid OU-SHE 2023/24 (Innsbruck)
- Euclid 2023
- Euclid OU-SHE 2022/23 (Edinburgh)
- Euclid 2022
- Euclid France 2021
- XVII J-PAS Collaboration Meeting (May/2019)
- Mini-JPAS Virtual Workshop (Nov/2018)
- XII J-PAS Collaboration Meeting (Fev/2016)
- S-PLUS/J-PLUS/A-PLUS/J-PAS meeting IAG (Aug/2015)
- XI J-PAS Collaboration Meeting (Mar/2015)

Complementary Activities

Teaching Assistantship

- Cosmology (2x)
- Data Analysis for Astronomy (2x)
- Fundamentals of Astronomy

Outreach

- Explore JPL 2023
- Virada Científica USP (2015)

Past Professional Experience

Spectrum, B2m, Editora Online, Optimize (2001-2008)

- Code performance analysis
- Code optimisation
- Database Administration
- Modular enterprise Java programming
- Interactive webpage programming