

PERSONAL INFORMATION	<p>FULL NAME : Gustavo Enrique Medina Toledo</p> <p>ADDRESS : 50 St. George Street, Toronto, ON M5S 3H4, Canada</p> <p>CITIZENSHIP : Chile</p> <p>EMAIL : <a href="mailto:gustavo.medina@utoronto.ca">gustavo.medina@utoronto.ca</a></p> <p>TELEPHONE : (+49) 178 5284200</p> <p>ORCID : <a href="https://orcid.org/0000-0003-0105-9576">0000-0003-0105-9576</a> (Refereed only; Link to full list: <a href="#">ADS</a>)</p>
RESEARCH INTERESTS	Galactic archaeology, variable stars, kinematics of stars and clusters, RR Lyrae stars in the distant halo, dwarf galaxies in the Local Group, photometric/spectroscopic surveys.
EDUCATION	<p><b>Dr.rer.nat. (PhD) in Astronomy (2018 - 2022)</b> Heidelberg University, Heidelberg, Germany. <i>magna cum laude</i> <i>Thesis:</i> Unveiling the Milky Way's history using young &amp; old population variable stars <i>Supervisor:</i> Prof. Dr. Eva K. Grebel</p> <p><b>Master of Science in Astronomy (2015 - 2017)</b> Universidad de Chile, Santiago, Chile. <i>with highest distinction</i> <i>Thesis:</i> Searching for distant RR Lyrae in the Galactic halo using the HITS survey <i>Supervisor:</i> Prof. Dr. Ricardo Muñoz</p> <p><b>Bachelor of Science in Astronomy (2010 - 2014)</b> Universidad de Chile, Santiago, Chile. <i>with distinction</i></p>
PROFESSIONAL EXPERIENCE	<p><b>Postdoctoral Fellow (2023 - 2026)</b> David A. Dunlap Department of Astronomy &amp; Astrophysics, University of Toronto, Canada (<a href="#">Link</a>)</p> <p><b>Graduate Researcher (2015 - 2022)</b> Astronomisches Rechen-Institut, Heidelberg University, Germany (<a href="#">Link 1</a>, <a href="#">Link 2</a>) Departamento de Astronomía, Universidad de Chile, Chile (<a href="#">Link</a>)</p>
GRANTS, AWARDS AND FELLOWSHIPS	<p><b>Arts &amp; Science + Dunlap Postdoctoral Fellowship (276,000 CAD)</b> University of Toronto, <a href="#">2023</a> - <a href="#">2026</a>, Canada.</p> <p><b>Gemini Science Fellowship</b> NOIRLab, Gemini Observatory, <a href="#">2022</a> - <a href="#">2025</a>, Hawaii, USA. Declined to take postdoctoral position at the University of Toronto.</p> <p><b>Paris Sciences et Lettres (PSL) Fellowship</b> Observatoire de Paris, <a href="#">2022</a> - <a href="#">2024</a>, France. Declined to take postdoctoral position at the University of Toronto.</p> <p><b>Hector Fellow Academy Doctoral Fellowship (acceptance ratio: 2%; 215,000 EUR)</b> Hector Fellow Academy, <a href="#">2018</a> - <a href="#">2022</a>, Germany.</p> <p><b>IMPRS-HD Doctoral Fellow (acceptance ratio: 10%)</b> International Max Planck Research School for Astronomy and Cosmic Physics, <a href="#">2018</a> - <a href="#">2022</a>, Germany.</p> <p><b>Magíster Nacional Scholarship (acceptance ratio: 10%; 6,000,000 CLP)</b> Comisión Nacional de Investigación Científica y Tecnológica, <a href="#">2016</a>, Chile.</p> <p><b>Award for Academic Excellence (award winning ratio: 5%)</b> Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, <a href="#">2013</a> and <a href="#">2014</a>, Chile.</p> <p><b>As co-I</b></p> <p><b>Fondecyt Fellowship 2022 (PI: Muñoz, R.; grant acceptance ratio: 15%; 170,000,000 CLP)</b> Provides funding to support the HOWVAST survey development. Comisión Nacional de Investigación Científica y Tecnológica, <a href="#">2022</a> - <a href="#">2025</a>, Chile.</p>

## TECHNICAL SKILLS

**Programming Languages:** PYTHON, Stan, R, C, BASH, JAVA

**Others:** High Performance Computing, SQL,  $\text{\LaTeX}$ , Topcat (STILTS), SExtractor, MOOG, DS9, IRAF, iSpec, BASE-9, MESA

## OBSERVING EXPERIENCE

42.5 nights: DECam@Blanco 4 m telescope, Cerro Tololo Inter-American Observatory (2015 - 2024)

6 nights for DESI: Mayall 4 meter telescope, Kitt Peak National Observatory (2024)

2 nights: IMACS@Baade 6.5 m (Magellan) telescope, Las Campanas Observatory (2022)

5 nights: MIKE@Clay 6.5 m (Magellan) telescope, Las Campanas Observatory (2019 - 2024)

5 nights: HTS@SOAR 4.1 m telescope, Cerro Tololo Inter-American Observatory (2019)

3 nights: CCD Imager@Du Pont 2.5 m telescope, Las Campanas Observatory (2017)

2 nights: CCD Imager@SMARTS 0.9 m telescope, Cerro Tololo Inter-American Observatory (2013)

This list includes in-person and remote observations for the following surveys: DELVE, DESI, S<sup>5</sup>, HOWVAST, SMASH, Merian, HiTS, MADCASH, DECAT.

## SUCCESSFUL OBSERVING PROPOSALS

### As PI

“Improving the velocity estimation of the best distance tracers in the Milky Way outer halo observed by DESI”, 2024B, Spare fiber program for the Dark Energy Spectroscopic Instrument survey, KPNO-Mayall, DESI ( $\sim 4000$  outer halo RR Lyrae stars with DESI).

“Constraining the 3-D morphology and extension of the Orphan-Chenab kink with RR Lyrae stars”, 2024B, CTIO-Blanco, DECam (4 nights).

“Searching for evidence of the Orphan-Chenab stream progenitor with RR Lyrae stars”, 2024A, CTIO-Blanco, DECam (4 nights).

“The mass of the Milky Way with RR Lyrae at the Galactic outskirts”, 2024A, Gemini, GMOS-S (21 hr).

“Spectroscopy of RR Lyrae at the outer limits of the Milky Way”, 2020A, LBTO-LBT, MODS (5 hr)

“Spectroscopy of RR Lyrae at the outer limits of the Milky Way”, 2019B, LBTO-LBT, MODS (5 hr).

### As co-I

“The mass of the Milky Way with RR Lyrae at the Galactic outskirts”, 2024A, LCO-Clay, MIKE. PI: Muñoz, R. (12 hr).

“Spectroscopy of RR Lyrae at the Outer Limits of the Milky Way”, 2020B, LCO-Clay, MIKE. PI: Muñoz, R. (2 nights).

“Spectroscopy of RR Lyrae at the Outer Limits of the Milky Way”, 2019B, LCO-Clay, MIKE. PI: Muñoz, R. (2 nights).

“Improving Phase Coverage of RR Lyrae at the Outer Limits of the Milky Way”, 2019B, CTIO-SOAR, Goodman HTS. PI: Muñoz, R. (4 nights).

“Mapping the Outer Halo of the Milky Way with RR Lyrae”, 2018B, CTIO-Blanco, DECam. PI: Muñoz, R. (2 nights).

“Mapping the Outer Halo of the Milky Way with RR Lyrae”, 2018A, CTIO-Blanco, DECam. PI: Carlin, J. (2 nights).

“Mapping the Outer Halo of the Milky Way with RR Lyrae”, 2017B, CTIO-Blanco, DECam. PI: Muñoz, R. (2 nights).

“Mapping the Outer Halo of the Milky Way with RR Lyrae”, 2017B, CTIO-Blanco, DECam. PI: Carlin, J. (1 night).

“The High cadence Transient Survey (HiTS)”, 2015A, CTIO-Blanco, DECam. PI: Förster, F. (9.5 nights).

INVITED TALKS,  
& SEMINARS

- “Tales from a dark matter halo: the outer Milky Way as a cosmic laboratory, Milky Way and Andromeda: the odd couple!” **invited talk at conference**, Sexten, Italy (Feb/2025)
- “Dynamical modeling and orbit integration of distant Milky Way stars”, **Invited lecturer at workshop on stellar chemistry and kinematics**, Goethe Universität Frankfurt, Frankfurt, Germany (July/2024)
- “The structure and accretion history of the Milky Way using halo RR Lyrae stars in photometric and spectroscopic surveys”, AIP Colloquium, Leibniz-Institut für Astrophysik Potsdam, Potsdam, Germany (July/2024)
- “The structure and accretion history of the Milky Way from the combination of photometry and spectroscopy of halo RR Lyrae stars”, NOIRLab Colloquium, NOIRLab, La Serena, Chile (Apr/2024)
- “The Halo Outskirts With Variable Stars (HOWVAST) survey: exploring the outer Milky Way with RR Lyrae stars”, TASTY Seminar, University of Toronto, Toronto, Canada (Dec/2023)
- “A census of Cepheids in open clusters in the era of Gaia”, MPA, Heidelberg, Germany (Jun/2021)
- “Exploring the outskirts of the Milky Way with RR Lyrae stars”, ARI, Heidelberg University, Heidelberg, Germany (Jul/2019)
- “Searching for distant RR Lyrae in the Galactic halo using the High cadence Transient Survey”, AURA, La Serena, Chile (Aug/2018)

PARTICIPATION IN  
SCIENTIFIC EVENTS

**Conferences** ([T]: Contributed Talk, [P]: Poster Presentation)

- DESI annual collaboration meeting, Cancún, Mexico (Dec/2024) **T**
- The RR Lyrae and Cepheid meeting 2024 Frontiers of Classical Pulsators, Marrakesh, Morocco (Nov/2024) **T**
- Resolved stellar populations from photographic plates to large surveys, Florence, Italy (Oct/2024) **T**
- DESI Milky Way International Workshop, Toronto, Canada (Aug/2024) **T**
- Canadian Astronomical Society (CASCA) Annual General Meeting 2024, Toronto, Canada (Jun/2024) **T**
- Globular Clusters and Their Tidal Tails: From the Milky Way to the Local Group, Toronto, Canada (May/2024)
- 55th Annual Meeting of the AAS Division of Dynamical Astronomy (DDA), Toronto, Canada (May/2024) **T**
- DESI collaboration meeting, Kona, USA (Dec/2023) **T**
- LSST@Europe5: Towards LSST science, together!, Poreč, Croatia (Sep/2023) **T**
- Great Lakes Clusters and Streams, Ann Arbor, USA (Aug/2023) **T**
- DESI General Meeting, Durham, UK (Jul/2023)
- DESI Milky Way Survey Meeting, Durham, UK (Jul/2023) **T**
- Meeting of the Young German Astronomical Society, Bamberg, Germany (Jul/2023)
- Hector Fellow Academy Symposium 2023, Berlin, Germany (Jul/2023)
- Canadian Astronomical Society (CASCA) Annual General Meeting 2023 - The Broad Spectrum of Canadian Astronomy, Penticton, Canada (Jun/2023) **T**
- IAU Symposium 376 - At the cross-roads of astrophysics and cosmology: Period–luminosity relations in the 2020s, Budapest, Hungary (Apr/2023) **P**
- Wide-Field Spectroscopy vs Galaxy Formation Theory, Tucson, USA (Mar/2023)
- RRL/Cep 2022 - Large-scale surveys as bridges between spectroscopy and photometry, La Palma, Spain (Sep/2022) **T**
- Annual Meeting of the German Astronomical Society, Bremen, Germany (Sep/2022) **T, P**
- Hector Fellow Academy Symposium 2022, Karlsruhe, Germany (Jul/2022) **T**
- European Astronomical Society Annual Meeting 2022, Valencia, Germany (Jun/2022)

- Star Clusters: the Gaia Revolution, Online (Oct/2021) **P**
- Hector Fellow Academy Symposium 2021, Online (Jul/2021)
- Streams 21: Constraints on Dark Matter, Online (Feb/2021)
- Linking the Galactic and Extragalactic conference series, Online (Dec/2020)
- Hector Fellow Academy Symposium 2020, Online (Jul/2020)
- AAVSO 108th Annual Meeting, Las Cruces, USA (Oct/2019) **P**
- RRL/Cep 2019 - Frontiers of Classical Pulsators, Cloudcroft, USA (Oct/2019) **T, P**
- Hector Fellow Academy Symposium 2019, Heidelberg, Germany (Jul/2019) **P**
- Astrominformatics 2019 International Conference, Pasadena, USA (Jun/2019)
- IV workshop Millennium Institute of Astrophysics MAS, Machalí, Chile (Jan/2017) **T**
- The RR Lyrae 2017 conference - Revival of the Classical Pulsators, Niepolomice, Poland (Sep/2017) **T**
- 5th CMM Pucón Symposium, Puerto Varas, Chile (Aug/2017)
- SOCHIAS 2017 - Annual Meeting, Maitencillo, Chile (Jan/2017) **T**
- III workshop Millennium Institute of Astrophysics MAS, Viña del Mar, Chile (Dec/2016) **T**
- Towards Science in Chile with LSST 2016 Workshop, Viña del Mar, Chile (Dec/2016) **P**
- 22nd Los Alamos Stellar Pulsation Conference Series Meeting, San Pedro, Chile (Nov/2016) **P**
- SOCHIAS XIII - Annual Meeting, Antofagasta, Chile (Mar/2016) **P**
- II workshop MAS, Olmué, Chile (Nov/2015)
- Anillo Workshop Closing Meeting 2015: Testing from Chile Fundamental Theories with new Observations, Santiago, Chile (Nov/2015) **T**
- High-precision Studies of RR Lyrae stars, Visegrad, Hungary (Oct/2015) **T**
- Pucón Symposium 2015: Advanced Tools Applied to Frontier Astronomy, BioMedicine and Massive Data-driven Sciences, Puerto Varas, Chile (Aug/2015)
- Astrominformatics 2014 International Conference, Viña del Mar, Chile (Nov/2014) **P**
- I workshop Millennium Institute of Astrophysics MAS, Los Andes, Chile (Aug/2014) **P**

### Workshops & Schools

- 47th Heidelberg Physics Graduate Days: “Bayesian inference on Milky Way datasets”, and “Geometric Deep Learning”, Heidelberg, Germany. (Oct/2021)
- 10th Modules for Experiments in Stellar Astrophysics (MESA) summer school 2021, Online. (Aug/2021)
- Bayesian Analysis for Stellar Evolution with nine variables (BASE-9) Workshop, Online. (Jun/2021)
- 45th Heidelberg Physics Graduate Days: “Modern Galactic dynamics in the era of plentiful data”, and “An introduction to gravitational-wave astrophysics” Heidelberg, Germany. (Oct/2020)
- LSST/Rubin Observatory Project & Community Workshop 2020, Online. (Aug/2020)
- 13th IMPRS-HD Heidelberg Summer School: Gaia Data & Science, Heidelberg, Germany. (Sep/2018)
- Workshop on using TOPCAT, STILTS, and ADQL on Astronomical databases, Santiago, Chile. (Oct/2017)
- 11th IMPRS-HD Heidelberg Summer School: Astrostatistics & Data Mining, Heidelberg, Germany. (Sep/2016)
- Scientific Writing for Young Astronomers School (SWYA), Puerto Varas, Chile. (Apr/2016)
- “Astrophysics and R” (by Dr. Eric D. Feigelson), Santiago, Chile. (Apr/2016)
- 3rd La Serena School for Data Science: Applied tools for astronomy, La Serena, Chile. (Aug/2015)

COLLABORATIONS,  
MEMBERSHIPS,  
AND LEADERSHIP  
ROLES

**Principal investigator** of the Halo Outskirts with Variable STars ([HOWVAST](#)) survey (2017-)  
Active participation in the Ultraviolet Near Infrared Northern Survey ([UNIONS](#)) collaboration (2024-)  
Active participation in the Dark Energy Spectroscopic Instrument ([DESI](#)) Milky Way Survey collaboration (2023-)  
Active participation in the DECam Local Volume Exploration Survey ([DELVE](#)) collaboration (2022-)  
Active participation in the Southern Stellar Stream Spectroscopic Survey ([S<sup>5</sup>](#)) collaboration (2022-)  
Participation in the [Merian Survey](#) (2022-)  
Active participation in the High cadence Transient Survey ([HiTS](#)) collaboration (2014-2018)

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**DELVE WIDE Collaboration Coordinator** (2023-)

**Chair of the Local Organizing Committee (LOC) and member of the Scientific Organizing Committee (SOC)** of the DESI-Milky Way Survey workshop 2024, held in Toronto, Canada

Member of the organizing committee of the Summer Undergraduate Research Program ([SURP](#)), University of Toronto (2023, 2024)

Convener of the Near Field Cosmology (NFC) weekly group meeting, University of Toronto (2023-)

Regular contributions to Galaxy Evolution and Stellar Astrophysics group meetings

Established connections between members of several institutions, as the organizer of research visits and fosterer of collaborations (University of Toronto, University of Heidelberg, MPA, NOIRLab, Universidad de Chile, Goethe University of Frankfurt, Pontificia Universidad Católica de Chile)

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Member of the Canadian Astronomical Society ([CASCA](#)) (2024-)

Member of the American Astronomical Society ([AAS](#)) and the Division on Dynamical Astronomy ([DDA](#)) (2024-)

Member of the German Astronomical Society (Astronomische Gesellschaft, [AG](#)) (2022-)

ASTRONOMICAL  
SERVICE

**External panelist for the Hubble Space Telescope (HST) Time Allocation Committee (Cycles 32 and 33, Stellar Populations section)**

Peer-reviewing referee for the Astronomy & Astrophysics (A&A) and the Monthly Notices of the Royal Astronomical Society (MNRAS) journals (1–2 papers per year)

Peer-reviewing referee for the allocation of observing time with the Gemini telescope, in conjunction with the Canadian Time Allocation Committee (CanTAC)

ADDITIONAL  
TRAINING

Management Skills – MBA Fundamentals Program for Doctoral Researchers (Karlsruhe Institute of Technology, Germany)

- Information and Data Analytics (Jan/2021)
- Project Management (Oct/2020)
- Intercultural Training (Jul/2020)
- Human Resources Management (Jan/2019)

TEACHING  
EXPERIENCE  
(AS TEACHING  
ASSISTANT)

**Winter 2020:** Astronomical Techniques (Block), Heidelberg University

**Winter 2020:** Astronomy Laboratory, Heidelberg University

**Summer 2019:** Introduction to Astronomy and Astrophysics II, Heidelberg University

**Winter 2019:** Astronomical Techniques (Block), Heidelberg University

**Spring 2016:** Experimental Astronomy, Universidad de Chile

**Autumn 2016:** Experimental Astronomy, Universidad de Chile

**Spring 2015:** General Astronomy, Universidad de Chile

**Autumn 2015:** General Astronomy, Universidad de Chile

STUDENTS  
SUPERVISED

Undergraduate students

- Joseph Tang (co-supervised with Prof. Ting Li) - University of Toronto (ON, Canada)  
“Membership determination of stellar streams in the DESI survey” (May/2024–)  
Results: TBD
- Wesley Luo - University of Toronto (ON, Canada)  
“Comparing the dynamical properties of DESI stellar streams with cold and warm dark matter simulations” (May/2024–)  
Results: Quantification of the dependence of the velocity dispersion of streams on dark matter models.
- Harlin Toor - University of Toronto (ON, Canada)  
“Tracing the stellar halo of the Milky Way with blue horizontal-branch stars in the deep wide-field DELVE survey” (May/2024–Sep/2024)  
Results: Catalog of BHB stars in the DELVE survey using Bayesian mixture models. Measurement of the halo shape out to  $\sim 100$  kpc with BHB stars.
- Maia Wertheim - University of Toronto (ON, Canada)  
“Hunting for faint stellar streams in the distant Milky Way halo using DECaLS, DELVE, and UNIONS” (May/2023–)  
Results: Identification of several stream candidates using the matched filter technique. Publication in preparation.
- Phebe T-Giorgis - Simon Fraser University (BC, Canada)  
“Searching for RR Lyrae stars in the Aquarius II ultra-faint dwarf galaxies” (May/2023–Sep/2023)  
Results: Several RR Lyrae candidates detected in Aquarius II using multi-epoch photometry.
- Andrew Li (co-supervised with Prof. Ting Li) - University of Toronto (ON, Canada)  
“Detection and characterization of stellar streams using S<sup>5</sup>” (Jan/2023–)  
Results: Membership lists of streams in S<sup>5</sup> using Gaussian Mixture Modelling and characterization of two streams with multiple components: Jhelum and Indus. Publication in preparation.
- Grace Yu (co-supervised with Prof. Ting Li) - University of Toronto (ON, Canada)  
“Tracing the Milky Way Density Profile with Blue Horizontal Branch stars in the Dark Energy Survey ” (Jan/2023–Jan/2024)  
Results: Classification of BHB stars in the DES survey using a Bayesian mixture model and mapping the stellar density profile  $< 70$  kpc. Results published in the A&A journal ([link](#)).

High school students (as part of the [Visions of Science](#) program)

- Adheena Fatimah and Heruye Gared - University of Toronto (ON, Canada)  
"Hunting for Milky Way hypervelocity stars with spectroscopy" (July-August 2024)

PUBLIC OUTREACH

- Talk “La Vía Láctea y las distancias a escala Galáctica” offered remotely and in person for several rural schools in Chile (2021-)
- Talk “The Milky Way: Our Home in the Universe” offered for the Astronomy in Action Space Rangers Summer Camp (Aug/2023)
- Talk “Astronomy in the 21st century” offered remotely for diverse schools in Canada and the US (2023-)
- Volunteer at the “Astronomy on TAP” outreach events at the University of Toronto (2023-)
- Volunteer at the “Universe” outreach program of the University of Toronto (2023-)
- Panelist at the 2023 Visions of Science Empower Leadership Program career event at the University of Toronto (July/2023)
- Guide on high-school visits to the Department of Astronomy and Astrophysics, University of Toronto, Canada (2023-)
- Guide on the national heritage day at the National Astronomical Observatory, Chile (May/2017)

LANGUAGES

- Spanish (Native speaker)  
English (Fluent)  
German (Intermediate - Goethe-Zertifikat B1 - B2)