

DAVID REBOLLEDO

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PERSONAL

Born in Santiago, Chile in 1982. Chilean citizen.

EDUCATION

University of Illinois at Urbana-Champaign (2007-2013)

Ph. D. in Astronomy. Degree received in December 2013.

Advisor: Dr. Tony Wong.

Thesis Title: Gas Distribution, Star Formation and Giant Molecular Cloud Evolution in Nearby Spiral Galaxies.

G.P.A. 3.94/4.0

University of Chile (2001-2007)

Received M. S. in August 2007 in Astronomy, *with highest distinction.*

Advisor: Dr. Guido Garay.

Thesis Title: Dynamic Properties of the Dense Molecular Clumps in the Star Forming Regions NGC 6334 and NGC 6357.

Received B. S. in December 2006 in Astronomy, *with distinction.*

RESEARCH EXPERIENCE & TECHNICAL EXPERTISE

My research interest has been mainly focused on the different phases of the interstellar medium and the process of star formation at different size scales. I specialize in the observation and analysis of the CO emission line in nearby galaxies and the Milky Way in order to investigate the physical properties of molecular clouds, and the usefulness of CO as a tracer of the total molecular gas. My expertise also extends to the study of the hydrogen atomic gas through the analysis of the hydrogen 21-cm line maps, the process of radio continuum images and to the use of Herschel infrared images to derive physical properties of the dust in the interstellar medium.

A significant part of my academic training has been dedicated to investigate the best techniques to process interferometric data. I have experience with wide-field imaging, multi-frequency synthesis and different approaches to combine single dish images with interferometric data.

I am a passionate observer, with a long experience built on several radio telescopes such as the Combined Array for Research in Millimeter-wave Astronomy, the Australia Telescope Compact Array, the Mopra and Nanten2 telescope, covering wavelengths from millimeters to centimeters.

EMPLOYMENT

2016-current: *Astronomy Department, University of Chile.* Postdoctoral Research Associate. Research project to map regions of massive star formation in the Carina Nebula using the ALMA telescope.

2013-2016: *Sydney Institute for Astronomy, School of Physics, The University of Sydney.* Postdoctoral Research Associate. Research project to map and model the Carina Nebula at radio wavelengths to address outstanding questions relating to massive star formation and the interrelated roles of different gas phases of the interstellar medium.

2013-2016: *School of Physics, University of New South Wales.* Postdoctoral Research Visitor. Research project to study the molecular environment of the Carina Nebula with the Mopra telescope.

2010-2013: *University of Illinois at Urbana-Champaign.* Research Assistant under the supervision

of Dr. Tony Wong. Combined Array for Research in Millimeter-wave Astronomy (CARMA). Observations of the CO(2→1) and CO(1→0) of giant molecular clouds in the nearby galaxies NGC 6946, NGC 5457 and NGC 628 using CARMA. Study of molecular clouds properties and their star formation activity. Regular observer at CARMA.

2008-2010: *University of Illinois at Urbana-Champaign.* Research Assistant under the supervision of Dr. Tony Wong. Connecting HI and CO line profiles and Tully-Fisher relations. Study of how gas distributions and kinematics affect integrated HI and CO line profiles, with an eye towards interpreting the integrated spectra of distant galaxies.

2006-2007: *University of Chile.* Research Assistant under the supervision of Dr. Guido Garay and Dr. Diego Mardones. Observations of the dense clumps in the star forming regions NGC 6334 and NGC 6357 using the Swedish-ESO Submillimeter Telescope (SEST) in the CS(2→1) and ¹³CO(2→1) lines.

SKILLS

Languages: Spanish (native), English (fluent).

Programming: IDL, C-shell.

Software Packages: MIRIAD, CASA, Gridzilla, Livedata.

Operating systems: Mac OS X, Windows, Linux.

TELESCOPE TIME GRANTED

ALMA Cycle-4: 2.33 hours for the C-40 12m array, and 11.6 hours for the ACA array.

Australia Telescope Compact Array: 607 hours, 11 array configurations. 246 hours as Principal Investigator. Large project status granted.

Combined Array for Research in Millimeter-wave Astronomy: 464 hours as Principal Investigator, 3 array configurations.

Co-PI in successful proposals to use the ALMA, Green Bank Telescope and Mopra telescope.

TECHNICAL WORKSHOPS

2014: Radio Astronomy School, CSIRO Astronomy and Space Science, Narrabri, Australia.

2013: Australian ALMA community workshop, Sydney, Australia.

2009: CARMA Summer School, Cedar Flat, California, USA.

MAJOR COLLABORATORS

Research projects have allowed me to establish collaborations with major research institutions in the Unites States and Australia:

University of New South Wales [Michael Burton, Catherine Braiding]

University of Illinois [Tony Wong]

The University of Sydney [Anne Green, Cormac Purcell]

The Ohio State University [Adam Leroy]

Stony Brook University [Jin Koda]

National Radio Astronomy Observatory [Jennifer Donovan Meyer]

Australia Telescope National Facility [Shari Breen, Yanett Contreras]

REFEREED PUBLICATIONS

Rebolledo, D., Burton, M. G, Green, A., Braiding, C., Molinari, S., Wong, G. F., Blackwell, R., Elia, D. & Schisano, E. 2016, “The Carina Nebula and Gum 31 molecular complex: I. Molecular gas distribution, column densities and dust temperatures”, *The Monthly Notices of the Royal Astronomical Society Journal*, 456, 2406.

Rebolledo, D., Wong, T., Xue, R., Leroy, A., Koda, J. & Donovan Meyer, J. 2015, “Scaling Relations of the properties of CO Resolved Structures in Nearby Galaxies”, *The Astrophysical Journal*,

808, 99.

Braiding, C., Burton, M. G., Blackwell, R., Glück, C., Hawkes, J., Kulesa, C., Maxted, N., **Rebolledo, D.**, Rowell, G., Stark, A., Tothill, N., Urquhart, J. S., Voisin, F., Walsh, A. J., de Wilt, P., Wong, G. F. 2015, “The Mopra Southern Galactic Plane CO Survey - Data Release 1”, *Publications of the Astronomical Society of Australia*, Volume 32, e020.

Donovan Meyer, J., Koda, J., Momose, R., Mooney, T., Egusa, F., Carty, M., Kennicutt, R., Kuno, N., **Rebolledo, D.**, Sawada, T., Scoville, N. & Wong, T. 2013, “Resolved Giant Molecular Clouds in Nearby Spiral Galaxies: Insights from The CANON CO(1-0) Survey”, *The Astrophysical Journal*, 772, 107.

Rebolledo, D., Wong, T., Leroy, A., Koda, J. & Donovan Meyer, J. 2012, “Giant Molecular Clouds and Star Formation in the Non-grand Design Spiral Galaxy NGC 6946”, *The Astrophysical Journal*, 757, 155.

Muñoz, D. J., Mardones, D., Garay, G., **Rebolledo, D.**, Brooks, K. & Bontemps, S. 2007, “Massive Clumps in the NGC 6334 Star-forming Region”, *The Astrophysical Journal*, 668, 906.

PUBLICATIONS IN PREPARATION

Rebolledo, D., Green, A., Burton, M. et al. “The Carina Nebula and Gum 31 molecular complex: II. Atomic to Molecular gas ratio and the X_{CO} Factor”. To be submitted to The Monthly Notices of the Royal Astronomical Society Journal.

Rebolledo, D., Wong, T., et al. “High Resolution Observations of the CO Emission over the Full Disk of the Spiral Galaxy NGC 6946”. To be submitted to The Astrophysical Journal.

RESEARCH FUNDING & GRANTS

“*The Mopra Telescope*”. Linkage Infrastructure, Equipment and Facilities, Australian Research Council. **2015**. Participate as Chief Investigator. Amount: \$150K AUD for 1 year.

TEACHING & STUDENT MENTORING

2004: *University of Chile*. Teaching assistant of the course *Introduction to Newtonian Physics*. Really motivated to teach *Introduction to Newtonian Physics* at undergraduate level. At graduate level, *Galactic Astronomy* and *Radio Astronomy*.

I have experience assisting students with science projects. I have trained students to use computational tools to estimate physical quantities from molecular spectral line observations and dust emission.

HONORS & AWARDS

Fulbright-Conicyt Fellowship for graduate studies in the United States, 2007-2011.

Moises Mellado Award for outstanding students, University of Chile, 2003-2006.

Juan Gómez Millas Scholarship for undergraduate studies, University of Chile, 2001-2006.

SERVICE, OUTREACH

Active member of the Local Organizing Committee of the Astronomical Society of Australia’s Annual Meeting, 2016, University of Sydney, 2016, July.

Organizer of the workshop “Celebrating Mopra: Looking to the Future”, University of New South Wales, 2015, December.

Organizer for weekly graduate seminar, Department of Astronomy, University of Illinois, Fall 2010.

Co-organizer for weekly Star Formation Journal Club, Department of Astronomy, University of Illinois, Fall 2009.

SCIENCE TALKS

- “The HI-H₂ transition across the Carina Nebula-Gum 31 molecular complex”
The Astronomical Society of Australia’s Annual Meeting, 2016, University of Sydney, 2016, July.
- “The Carina Nebula and Gum 31 molecular complex: Molecular gas distribution, column densities and dust temperatures”
Workshop “Celebrating Mopra: Looking to the Future”, University of New South Wales, Sydney, 2015, December.
- “Scaling Relations of CO Resolved Structures in Nearby Spiral Galaxies, and What We Can Learn from the Carina Nebula”
Invited Seminar Talk, Swinburne University of Technology, Melbourne, 2015, August.
- “Unveiling the Molecular Environment of the Carina Nebula”
Annual Meeting, Astronomical Society of Australia, Perth, 2015, July.
- “Scaling Relations of CO Resolved Structures in Nearby Spiral Galaxies, and What We Can Learn from the Carina Nebula”
Multi-wavelength Dissection of Galaxies, Sydney, 2015, May.
- “The Carina Nebula: A Massive Star Factory and Anchor for Calibrating Extragalactic Star Formation”
Annual Meeting, Astronomical Society of Australia, Sydney, 2014, July.
- “CO Survey of the Carina Nebula with Mopra”
Nanten2 Consortium Workshop, Adelaide, Australia, 2014, February.
- “Star Formation and Giant Molecular Clouds Properties in Nearby Spiral Galaxies”
Phase transitions in the diffuse ISM, Blue Mountains, Australia, 2013, November.
- “Giant Molecular Clouds and Star Formation in Nearby Spiral Galaxies”
221st American Astronomical Society Meeting, Long Beach, California, 2013, January.
- “Giant Molecular Clouds and Star Formation in the Non-Grand Design Spiral Galaxy NGC 6946”
ESO-ALMA in Santiago, Chile, 2012, May.
- “Giant Molecular Clouds and Star Formation in the Non-Grand Design Spiral Galaxy NGC 6946”
University of Chile, Department of Astronomy, Santiago, Chile, 2012, May.
- “Giant Molecular Clouds in the Non-Grand Design Spiral Galaxy NGC 6946”
Astronomy Department Student Seminar, University of Illinois, 2012, April.
- “Giant Molecular Clouds in the Spiral Arm of IC 342”
Astronomy Department Student Seminar, University of Illinois, 2011, November.
- “Giant Molecular Clouds in the Non-Grand Design Spiral Galaxy NGC 6946”
CARMA, Big Pine, California, 2011, August.
- “The CO-to-H₂ Conversion Factor From Infrared Dust Emission Across the Local Group”
Astronomy Department Student Seminar, University of Illinois, 2011, March.
- “Extremely Inefficient Star Formation in the Outer Disk of Nearby Galaxies”
Astronomy Department Student Seminar, University of Illinois, 2010, November.
- “Models of Gas Properties in Spiral Galaxies”
Astronomy Department Student Seminar, University of Illinois, 2009, November.

PUBLIC TALKS

- “Following the Cosmic Trail of Star Formation”
Sutherland Astronomical Society, Sydney, Australia, April, 2016
- “Following the Cosmic Trail of Star Formation”
University of New South Wales, Sydney, Australia, May, 2015
- “La Astronomía y el Estudio del Universo”
Complejo Educacional Monseñor Luis Arturo Perez, Santiago, Chile, August, 2013

POSTER PRESENTATIONS

- “Giant Molecular Clouds and Star Formation in Nearby Spiral Galaxies”
Frontiers in Star Formation Conference, Yale University, New Haven, 2012, October.
- “The Interpretation of the Global CO and HI Spectra in Spiral Galaxies”
Global Properties of HI in Galaxies Workshop, Green Bank, West Virginia, 2012, April.
- “Giant Molecular Clouds and Star Formation in the Nearby Spiral Galaxy NGC 6946”
219th American Astronomical Society Meeting, Austin, Texas, 2012, January.
- “Molecular Cloud Formation and Gas Dynamics in the Nearby Spiral Galaxy NGC 6946”
4th meeting of the Midwest Astrochemistry Consortium, Urbana, Illinois, 2011, October.
- “Molecular Cloud Formation and Gas Dynamics in the Nearby Spiral Galaxy NGC 6946”
CARMA Science Symposium, Berkeley, California, 2011, February.
- “Gas Distribution and Star Formation in the Nearby Spiral Galaxy NGC 6946”
CARMA Science Symposium, Urbana, Illinois, 2009, October.

REFERENCES

- Professor Tony Wong
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University of Illinois
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- Professor Anne Green
School of Physics
The University of Sydney
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- Professor Michael Burton
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