

# Stefano Bovino

Curriculum Vitae

	Personal information
Name	Stefano Bovino
Date of birth	26 March 1982
Citizenship	Italian
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## Brief introduction

Theoretical and experimental study of chemical and physical processes under the extreme conditions of the interstellar medium both in gas-phase and at the interface gas-solid. Head of the Astrochemistry Group (the only in Chile) with now 10 active members among master students, PhD, and postdocs. Director of the new Laboratory on Cosmic Dust. Scientific responsible of the high-performance cluster KULTRUN. Quantum dynamics, reactive scattering, and ab-initio calculations. Binding Energy Evaluation Platform (BEEP), a framework and database to calculate and store binding energies of molecules on the surface of solid particles of astrophysical interest.

## Education

2008–2011	PhD, School of Chemical Sciences, Sapienza University of Rome.	
	<b>Dissertation</b> , Molecular processes in the early Universe: quantum dynamics chemical evolution with ab initio methods.	and
2007–2008	M.Sc. in Chemistry, Sapienza University of Rome.	
2005	B.Sc. in Chemistry, Sapienza University of Rome.	
	Research and Academic Appointments	
2019-current	<b>Associate Professor</b> , <i>Permanent</i> . Faculty of Physical Sciences, University of Concepcíon, Chile, starting date: 1st July 2	2019
2017-2019	Associate Professor, Tenure track.	
	Faculty of Physical Sciences, University of Concepcion, Chile, 01.12.2017-30.06.2019	
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- 2015-2017 Temporary position for Principal Investigators from the German Science Foundation, 3-years position for my own project. Hamburg University, Hamburg, Germany, 01.06.2015-30.11.2017
- 2012–2015 Postdoctoral Research Assistant, University of Göttingen, Göttingen, Germany.
- 2011–2012 **ISCRA postdoctoral fellow**, CINECA Supercomputing Center/Sapienza University of Rome, Italy.
  - 2008 **Short-term scholar**, Harvard University, Institute for Theoretical Atomic, Molecular and Optical Physics, Cambridge, USA, Supervised by Prof. A. Dalgarno.

#### Selected Honors and Awards

- 2022 AG Astrophysical Software Award 2022, German Astronomical Society Award for design and development of astrophysical computer programs that led to remarkable progress in astrophysical research, Prize: 3,000 EUR, jointly with Dr. T. Grassi, soon to be publicly announced.
- 2022 Visiting Professor, Excellence project funded by Ministry of University, Internationalization of the Master in Astrophysics & Cosmology 2022/2023., University of Padova, Italy, Oct. 2022-Jan.2023.
- 2022-current **Associate Researcher**. Institute of Radioastronomy, Istituto Nazionale di Astrofisica, Bologna, Italy
  - 2022-2031 National Scientific qualification (ASN) for Associate Professor, Disciplinary field: 03/B1 Principles of chemistry and inorganic systems.
  - 2022-2031 **National Scientific qualification (ASN) for Associate Professor**, *Disciplinary field: 02/C1 Astronomy, astrophysics, Earth and planetary physics*.
    - 2015 "Carla Roetti Medal" Italian Chemical Society, Theoretical and Computational Chemistry Division, "for his original contribution to the application of theoretical and computational chemistry methods to the astrophysics".
    - 2015 "Eigene Stelle" Temporary position for Principal Investigators from the German Science Foundation, *DFG Priority Program 1573: "Physics of the Interstellar Medium"*, Project title: "The low-metallicity ISM: From high redshift to the local Universe".
    - 2011 ISCRA Research Fellowship, CINECA Supercomputing Center.
    - 2010 Smithsonian Astronomical Observatory Visiting student Award, Institute for Theoretical Atomic, Molecular, and Optical Physics (ITAMP), Harvard-Smithsonian Center for Astrophysics, Cambridge, USA.
    - 2009 Smithsonian Astronomical Observatory Visiting student Award, Institute for Theoretical Atomic, Molecular, and Optical Physics (ITAMP), Harvard-Smithsonian Center for Astrophysics, Cambridge, USA.

#### **Research Grants**

I raised several individual and associative grants applying to highly competitive funding schemes. I am part of the largest center for studies related to astrophysics/astrochemistry in Chile, funded  $\sim 2$  million of euros per year on a scale of 10 years. I've participated to highly interdisciplinary projects at the edge astrophysics / chemistry to study the evolution of interstellar gas exposed to high-energy processes (e.g. black holes), and built my own group on the basis of competitive individual grants.

- 2022 PI Fondecyt Regular Project # 1220033, "Bridge the gap: unveiling the physics of star formation through chemistry", duration: 4 years, funds: 148,920,000 Chilen Pesos (~ 170 kEUR)
- 2021 **PI** Comité Mixto ESO-Chile 2021, "Visit of Dr. Elena Redaelli to strengthen and boost the collaboration among MPE and Chilean Institutions" duration: 2 years, funds: **3,660,000** Chilean Pesos (~3,800 EUR)
- 2021 Co-I II Concurso de Equipamiento Científico y Tecnológico Mayor, FONDEQUIP, EQY210001, "Renovación Infraestructura del Laboratorio Nacional de Supercomputación" duration: 2 years, funds: 950,000,000 Chilean Pesos (~1 million of EUR)
- 2021 Associate Researcher in the BASAL Center CATA 2 (Centro de Astrofísica y Tecnologías Áfines), duration: 5+5 years, funds: **1,630,000,000** Chilean Pesos per year (~1.7 millions of EUR)
- 2020 Co-I Fonecyt Postdoctorado # 3200841, "Effects Of High-energy Activities On The Chemistry Of molecular Gas In The Galactic Center", PI: Gao-Yuan Zhang, duration: 3 years, funds: 82,320,000 Chilean Pesos (~ 90 kEUR)
- 2020 Associate Researcher in the Millennium Nucleus on Transversal Research and Technology to explore Supermassive Black Holes. # NCN19\_058, duration: 3 years, funds: 630,000,000 Chilean Pesos (~700 kEUR)
- 2017 PI Fondecyt Iniciación Project # 11170268, "Deuteration chemistry: a tool to determine timescales during star formation", duration: 3 years, funds: 78,318,000 Chilen Pesos (~100 kEUR)
- 2017 PI Conicyt Redes Internacionales Project REDI170093, "Deuterium chemistry as diagnostic of the physical conditions of star-forming regions", duration: 2 years, funds: 17,350,000 Chilean Pesos (~23 kEUR)
- 2017 **Co-I** Proyecto QUIMAL170001 "First Computational Astrochemistry Laboratory Using the Largest Shared Memory Computer in Chile", duration: 3 years, funds: **200,000,000** Chilean Pesos (~260 kEUR)
- 2017 Associate Researcher in the Anillo # ACT172033 on "Formation and Growth of Supermassive Black Holes", duration: 3 years, funds: 450,000,000 Chilean Pesos (~ 500 kEUR)
- 2016 DFG Funds for the organization of the conference "Current and future perspectives of chemical modelling in astrophysics"  $\sim$ 7 kEUR.
- 2015 DFG Funds for visitors program  $\sim$ 5 kEUR.
- 2014 DFG Funds for visitors program  $\sim$ 5 kEUR.

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- 2014 **PI** of the project "The low-metallicity ISM: From high redshift to the local Universe" under the DFG Priority Program 1573: "Physics of the Interstellar Medium",  $\sim$ **360 kEUR** for a 3 year postdoctoral position and one PhD position.
- 2013 DFG Funds for visitors program  $\sim$ 2 kEUR
- 2013 DFG Funds for the School "KROME: a package dedicated to chemistry and ISM physical processes in 3D simulations"  $\sim$ 3.5 kEUR

University Service

I actively participate to fundamental administrative duties within the departments of Physics, Astronomy, and Chemistry.

Aug.2022-	Director Astronomy Master Studies.
	Department of Astronomy, Universidad de Concepción, Faculty of Physics
12/2021-	Director (replacement) Astronomy Master Studies.
03/2022	Department of Astronomy, Universidad de Concepción, Faculty of Physics
Since	Member of the Physics Master Studies Committee.
08/2021	Department of Physics, Universidad de Concepción, Faculty of Physics
Since	Member of the Physics PhD Studies Committee.
08/2021	Department of Physics, Universidad de Concepción, Faculty of Physics
Since	Member of the Astronomy Master Studies Committee.
03/2021	Department of Astronomy, Universidad de Concepción, Faculty of Physics
Since	Member of the Astronomy Undergraduate Studies Committee.
03/2020	Department of Astronomy, Universidad de Concepción, Faculty of Physics
Since	Member of the PhD Programme in Chemical Sciences.
03/2020	Faculty of Chemical Sciences, University of Concepción
Since 2010	Scientific and technical responsible of the HDC eluster Kultzun 1

Since 2018 Scientific and technical responsible of the HPC cluster Kultrun, 18 nodes with 576 cores, and a shared memore machine with 224 cores and 3 TB RAM.

## Mentoring

I have served as thesis committee member in several thesis defenses in different majors (Physics, Chemistry, Astronomy, Geophysics), and supervise students at all levels of their career in Astronomy, Physics, and Chemistry programmes. I have supervised 5 Master students, 3 PhD students, and 4 undergraduates. Two of my master students are now enrolled in prestigious PhD programs in Europe.

#### Teaching experience in the last 3 years

- 2019-current **Interstellar Medium**, *compulsory course for Master students, Astronomy*, Semester II: August-January, 5 hours per week, Universidad de Concepción.
- 2018-current **Introduction to Astrochemistry**, *elective course for Undergraduate, Master and PhD students Physics/Astronomy*, Semester I: March-July, 5 hours per week, Universidad de Concepción.

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2018-2019 Radiative Processes in Astrophysics, compulsory course for Master students, Astronomy, Semester II: August-November, 5 hours per week, Universidad de Concepción.

### Short-term visits & Official Collaborations

- Nov 2021- Scientific collaboration, ALMA Regional Center, Bologna, Project: Galactic Astrochemistry, Pl: Jan Brand, Postdoc: Giovanni Sabatini. Nov. 2021-Dec.2022
- Nov 2021 **Short-term visit**, Institute of Radioastronomy Bologna. Host: Dr. J. Brand
- Sept. 2019 **Short-term visit**, Center for Astrophysics | Harvard & Smithsonian. Host: Institute for Theoretical Atomic Molecular Optical Physics.
- June 2019 **Short-term visit**, Institute of Radioastronomy Bologna. Host: Dr. A. Giannetti
- June 2019 **Short-term visit**, Institut de Planétologie et d'Astrophysique de Grenoble. Host: Prof. C. Ceccarelli
  - Oct-Nov **Short-term visit**, Department of Astronomy, University of Concepcíon, Chile. 2016 Host: Prof. D. Schleicher
- May 2016 **KITP Member**, KITP Program: "The Cold Universe", Kavli Institute for Theoretical Physics, University of California, Santa Barbara, USA.
- Nov 2014 **Short-term visit**, Scuola Normale Superiore, Pisa, Italy. Host: Prof. A. Ferrara.
- Jun-Jul 2013 **Short-term visit**, Sapienza University of Rome, Rome, Italy. Host: Prof. F. A. Gianturco
- Jul-Aug 2010 **Visiting Student**, ITAMP, Harvard University, Cambridge, USA, Host: Prof. A. Dalgarno.
- Jun-Jul 2009 **Visiting Student**, ITAMP, Harvard University, Cambridge, USA, Host: Prof. A. Dalgarno.
  - May 2009 **Short-term visit**, CNRS, Université de Bordeaux, Talence, France. Host: Prof. T. Stoecklin

#### Organized International Conferences, Workshops, and Schools

- 2021 **KROME: 5th computational astrochemistry school**, online, 27-29 November 2018, sponsored by Fondecyt/Conicyt, LOC/SOC. www.kromepackage.org/bootcamp
- 2020 Supermassive Black Holes: Formation, growth and evolution, online, 7-11 December 2020, sponsored by ANID, LOC/SOC. https://smbh.udec.cl
- 2020 First Stars VI, Concepción, 1-6 March 2020, sponsored by ANID, LOC. http://www.astro.udec.cl/FirstStarsVI/

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- 2018 **KROME: 4th computational astrochemistry school**, Concepción, Chile, 27-29 November 2018, sponsored by Fondecyt/Conicyt. www.kromepackage.org/bootcamp
- 2017 **Benchmarking astrochemical models**, Hamburg, Germany, 03 November 2017, mini-workshop sponsored by the German Science Foundation.
- 2017 **Current and future perspectives of chemical modelling in astrophysics**, Hamburg, Germany, 17-19 July 2017, sponsored by the German Science Foundation. www.hs.uni-hamburg.de/astromodel2017
- 2016 **KROME: 3rd computational astrochemistry school**, Florence, Italy, 19-21 September 2016, sponsored by iALMA. www.kromepackage.org/bootcamp/2016
- 2015 **KROME: 2nd computational astrochemistry school**, Copenhagen, Denmark, 20-24 July 2015, sponsored by the Science PhD school, University of Copenhagen. www.kromepackage.org/bootcamp/2015
- 2014 **KROME:** 1st computational astrochemistry school, Göttingen, Germany, 17-19 September 2014, sponsored by the German Science Foundation (DFG). www.kromepackage.org/bootcamp/2014

#### Selected talks in the last 3 years

- Jun. 2022 **CATA meeting**, *Invited: Chemistry as a diagnostic of star formation*, Hotel Pullman el Bosque, Santiago, 09-10.06.2022.
- Apr. 2021 **CAS Seminar**, *Invited: Chemistry as a diagnostic of star formation*, Center for Astrochemical Studies | Max Planck Institute for Extraterrestrial Physics, online.
- Sept. 2019 **AMP Seminar**, *Invited: Chemistry as a diagnostic of star formation*, Center for Astrophysics | Harvard & Smithsonian, Cambrdige, USA.
- Jun. 2019 **Coffee Talk**, *Invited: The physics of star-formation through astrochemistry*, Insitute of Radioastronomy, Bologna, Italy.
- Jun. 2019 **Colloquium**, *Invited: Freeze-out and deuteration in high-mass star-forming regions*, Institut de Planétologie et d'Astrophysique de Grenoble, Grenoble, France.
- Jun. 2019 From the Interstellar Medium to the Large Scale Structure of the Universe, Invited: Chemical complexity in hydrodynamical simulations, Stockholm, Sweden.
- Apr. 2019 **Colloquium**, *Invited: Astrochemistry: a new window into the physics of star formation*, Pontificia Universidad Catolica de Chile, Santiago, Chile.
- Apr. 2019 New Quests in Stellar Astrophysics IV, Contributed Talk: A timeline for massive star-forming regions via astrochemical studies, Puerto Vallarta, Mexico.
- Jan. 2019 Basal Area 1 Annual Meeting, *Talk: The star formation process: from galactic to small scales*, Santiago, Chile.
- October 2018 **Colloquium**, *Invited: A timeline for massive star-forming regions via astrochemical studies*, Universidad Diego Portales, Santiago, Chile.
  - Oct. 2018 Segunda Reunión Binacional AAA-SOCHIAS, Contributed talk: The First Computational Astrochemistry Laboratory in Chile, La Serena, Chile.

- Sept. 2018 **II PUC-KIAA Bilateral WorkshopS**, *Invited talk: Chemistry as a driver of dynamical evolution in astrophysics: Supermassive black-holes and galaxies*, Santiago, Chile.
- March 2018 **Hydride Chemistry: from earth to space**, *Invited talk: Modelling hydrides chemistry in hydrodynamical simulations*, Telluride, Colorado, USA.

#### Memberships and Professional services

- 2021-present Member of the Chilean APEX TAC
- 2018-present Member of SOCHIAS, Chilean Astronomical Society
  - 2015-2018 Member of The Italian Chemical Society
  - 2015-2019 Member of the Royal Society of Chemistry, MRSC
  - 2013-2015 Part of the ISSI International Team for the project Europa (Early Universe: Research On Plasma Astrochemistry).
- 2011-present Referee for ApJ, MNRAS, A& A, Chem. Phys., and ACS Earth and Space Chemistry

#### Languages

- Mothertongue Italian
  - Advanced English, Spanish Basic German, French

Fluent Basic words