

Sebastián Pérez | CV

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Gemini-CONICYT postdoctoral fellow and MAD young researcher

Summary

I am astrophysicist currently studying the process of planet formation. Also, I am a published author and a musician leading projects on 1) embodied learning applied to astronomy, 2) the interplay between art and science, 3) general outreach and education. My latest papers include protoplanetary disk observational studies with ALMA, 3D hydrodynamic simulations of planet-disk interactions which reveal observational signposts of on-going planet formation, and general modelling of protoplanetary disks. I am interested in observational and theoretical perspectives on the primordial evolution of Solar Systems and on life in the Universe.

Education

University of Oxford

Doctor of Philosophy, PhD

Oxford, UK

2006–2009

Thesis: Inflow and outflow in stellar mass black holes, accretion disk theory and observations.

with Prof. Katherine M. Blundell

Universidad de Chile

Licenciatura en Ciencias mención Astronomía, BSc

Santiago, Chile

2002–2005

Graduated with distinction equivalent to a First-class honour (1st).

Research experience and funding

Universidad de Chile

Gemini-CONICYT research fellowship

Santiago, Chile

2017–2019

Main line of research: Observations and hydrodynamical simulations of planet formation

Universidad de Chile

Postdoc FONDECYT, young researcher at MAD

Santiago, Chile

2014–2017

Main line of research: Observations and hydrodynamical simulations of on-going planet formation

Millennium Nucleus on Protoplanetary Disks, U. Chile

MAD Postdoc

Santiago, Chile

2011–2014

Main line of research: Protoplanetary disks research with ALMA

University of Oxford

Postdoctoral fellow

Oxford, UK

2009–2011

Main line of research: accretion disks around black holes with jets (microquasars).

Responsibilities: Commissioning and development of the Global Jet Watch project network of telescopes.

Publication list (peer reviewed and published)

See attached file or click on the following link: [ADS library](#).

Synergetic projects on art, education, outreach and science

- Director of “Concierto Cielos de Chile” (2014–2018) convergence between music and astronomy. www.conciertocielos.cl
- Director of “Recreo Espacial” embodied learning project (2016–2018) for education and motivation into science through experiential activities and movement (current 2017 educational project).
- Author of the children’s novel about astronomy “**Bitácora Planetaria: Cazadores de Eclipses**”, 2016, LOM Ediciones.

AATS 2014: Director of the Art, Astronomy, Technology and Society initiative. In which I produced:

- Art+Astronomy Day at Contemporary Arts Museum (MAC), Santiago. Talks and activities for artists, educators and general public.
- Art+Astronomy Incubator initiative. Coordinator of 4 projects led by artists and astronomers.

AATS 2013 “El Origen del Sistema Solar”: Immersive installation at National Contemporary Arts museum (lead by artist Olaf Peña).

Grants

Research grants.....

2015: FONDEQUIP grant (100k USD) for GPU Cluster for hydro 3D simulations (PI-ed along with S. Casassus).

2014: FONDECYT Postdoctoral fellowship (120k USD).

Outreach grants.....

2017-2018: Fondo de la Música (Fondos de Cultura, Chile). To register the charango concerto based on the fundamental laws of astronomy. 15k USD.

2016, 2017: Outreach grant to research and produce resources for embodied learning applied to astronomy (20k USD) via Iniciativa Científica Milenio (PME MAD program, with S. Casassus, A. Yermakova).

2015: Outreach grant to create, illustrate, publish and distribute a children’s book about astronomy to encourage Women in Science (20k USD) via Iniciativa Científica Milenio (PME MAD program).

2014: Outreach grant for art+astronomy initiatives “AATS 2014” (20k USD), along with S. Casassus, via Iniciativa Científica Milenio (PME MAD program).

Selected Awards

- Djerassi Artist Residency for the Scientific Delirium Madness art+science program. The goal of the project is to explore and expand how the creativity of scientists and artists are connected. San Francisco, CA, USA. June 2018.
- PPARC (STFC) PhD Studentship – Particle Physics and Astronomy Research Council (PPARC UK). I was awarded the only such studentship available for South American students in 2006.
- Outstanding Undergraduate Student 2005 at Universidad de Chile (best 10% students of Physical and Mathematical sciences).

Review panels invitations

- Science Assessor for ALMA Cycles 5–8 (2017-2019), Scientific Category 4 Circumstellar disks, exoplanets and the solar system.
- Referee on major astronomy journals ApJ, ApJ Letters, A&A and MNRAS.
- Science Assessor and evaluator for XXI Concurso de Proyectos Explora, Conicyt.

Experience as supervisor and teacher

U. de Chile (2016-2017): Co-supervision of MSc students Marcelo Barraza (gas+dust hydro) and Felipe Flores (hydro+observations of vortices).

U. de Chile (2016-2017): Supervisor of undergraduate research projects: M. Araya (hydrodynamics of multiple planets), A. Dumas (radiation hydrodynamics) and M. Briceño (FU Ori ALMA observations).

U. de Chile (2015-2016): Supervisor of undergraduate research projects: Christian Flores, Marcelo Barraza and Felipe Flores.

Oxford: Lecturer Stellar Evolution and Cosmology (Astrophysics B3) to 3rd year Physics undergrads.

2002–2006 at U. de Chile: Teaching assistant for Electromagnetism and Statistical Physics.

Recent telescope time allocated as PI (2014–2017)

2017 – 2018:

ALMA Cycle 5: (long baselines) Survey of TTauri disks (DARTTS-A). 10h

SPHERE/VLT P101: Solar asteroid belt analogue. 0.5n

2016 – 2017:

ALMA Cycle 4: (long baselines) CPD detection. 11h

ALMA Cycle 4: (long baselines) Kinematics of FU Ori. 3h

ALMA Cycle 4: Protolunar disks II. 3h

VLA A-config: V883 Ori's snowline. 6h

SPHERE/VLT P98 and P99: Interacting protoplanetary disks Survey II. 0.9n

previus:

SPHERE/VLT P97: Interacting protoplanetary disks Survey I. 0.3n

ALMA Cycle 3: Protolunar disks. 3h

ALMA Cycle 2: Planet formation at a critical age. 5h

NACO/VLT P96: Circumstellar environ of ZCMa in high contrast polarimetry. 4h

NACO/VLT P96: Ionised nebula around black hole SS433. 2h in service + 4h visitor AGPM

MagAO/Baade 2014: Twin disks SR24, diffraction-limited imaging in Z' and K band. 2h

Recent conferences and workshops (selected)

- ESO Planet Formation 2016, ESO, Santiago.
Talk: [“Protoplanet detection and mass estimates via ALMA kinematics”](#)
- Disc Dynamics & Planets 2015, Larnaka, Cyprus.
Talk: [“Circumplanetary disc signposts in gas kinematics”](#)

- Transition Disks and Planet Formation 2015, Lorentz Workshop, Leiden, Netherlands.
Talk: “Observability of circumplanetary discs via ALMA gas kinematics”
- Protoplanetary disks and the planets they form 2014, MAD workshop, Calan, Chile
Chair and coordinator for the “Modelling and Observability of Planet Formation” session
- Characterising planetary systems across the HR diagram 2014, Cambridge, UK
Poster: “HD142527’s gap depth”
- Herbig Ae/Be stars: the missing link in star formation 2014, ESO Santiago, Chile
Talk: “HD142527 transition disk”
- Transformational Science with ALMA 2013: From Dust to Rocks to Planets, Hawaii, USA
Poster: “HD142527’s gap depth”
- ALMA Early Science conference 2012, Puerto Varas, Chile
Talk: “ALMA Cycle 0 observations of gas in HD142527’s gap”

Tools and technical expertise

Numerical Simulations: 3D hydrodynamic simulations of disk dynamics with FARGO3D.

Radiative Transfer: Continuum and line emission calculations with RADMC3D. Listed as developer in RADMC3D website. Also have experience with MCFOST and LIME.

Image synthesis: NRAO CASA

Programming languages: Python (astropy, numpy, scipy), Perl (PDL), C, CUDA GPU, L^AT_EX, OpenGL, Fortran, HTML5/CSS.

Recent outreach talks (2013–)

- Workshop talk on art and astronomy at UNESCO’s “Learning through Art” week. Coyhaique, Chile.
- More than 50 outreach talks at schools since 2013, in Chile (44), UK (4), South Africa (1) and India (2).
- Invited to talk about astronomy outreach at 6 radio shows at three major radio stations and three appearances on national TV.
- Invited to various “Dialogos en movimiento” by Consejo Nacional de Cultura y las Artes, at schools in Chile.

Other highlights

- Observing experience on VLT/SPHERE, ALMA, Gemini (North and South), Magellan, CTIO 4m, UH-88, VLA, SAAO 2m, GJW 1m
- Advanced English and Native Spanish.

Reference letters / People who are familiar with my work

Prof. Katherine M. Blundell

- Astrophysics, University of Oxford
- katherine.blundell@physics.ox.ac.uk

Prof. Lucas Cieza

- Nucleo de Astronomia, U. Diego Portales
- lucas.cieza@mail.udp.cl

Prof. Simon Casassus

- DAS, Universidad de Chile
- simon@das.uchile.cl

Prof. Dame Jocelyn Bell-Burnell

- Astrophysics, University of Oxford
- Jocelyn.BellBurnell@physics.ox.ac.uk

Publications list (peer-reviewed, published papers only)

- [1] G. H.-M. Bertrang, H. Avenhaus, S. Casassus, M. Montesinos, F. Kirchschrager, **Perez, S.**, L. Cieza, and S. Wolf. HD 169142 in the eyes of ZIMPOL/SPHERE. *MNRAS*, 474:5105–5113, March 2018.
- [2] L. A. Cieza, D. Ruíz-Rodríguez, **Perez, S.**, S. Casassus, J. P. Williams, A. Zurlo, D. A. Principe, A. Hales, J. L. Prieto, J. J. Tobin, Z. Zhu, and S. Marino. The ALMA early science view of FUor/EXor objects - V. Continuum disc masses and sizes. *MNRAS*, 474:4347–4357, March 2018.
- [3] D. A. Principe, L. Cieza, A. Hales, A. Zurlo, J. Williams, D. Ruíz-Rodríguez, H. Canovas, S. Casassus, K. Mužić, **Perez, S.**, J. J. Tobin, and Z. Zhu. The ALMA early science view of FUor/EXor objects - IV. Misaligned outflows in the complex star-forming environment of V1647 Ori and McNeil’s Nebula. *MNRAS*, 473:879–895, January 2018.
- [4] L. A. Cieza, S. Casassus, **Pérez, S.**, A. Hales, M. Cárcamo, M. Ansdell, H. Avenhaus, A. Bayo, G. H.-M. Bertrang, H. Cánovas, V. Christiaens, W. Dent, G. Ferrero, R. Gamen, J. Olofsson, S. Orcajo, A. Osses, K. Peña-Ramirez, D. Principe, D. Ruíz-Rodríguez, M. R. Schreiber, G. van der Plas, J. P. Williams, and A. Zurlo. ALMA Observations of Elias 224: A Protoplanetary Disk with Multiple Gaps in the Ophiuchus Molecular Cloud. *ApJL*, 851:L23, December 2017.
- [5] T. Stolker, M. Sitko, B. Lazareff, M. Benisty, C. Dominik, R. Waters, M. Min, **Perez, S.**, J. Milli, A. Garufi, J. de Boer, C. Ginski, S. Kraus, J.-P. Berger, and H. Avenhaus. Variable Dynamics in the Inner Disk of HD 135344B Revealed with Multi-epoch Scattered Light Imaging. *ApJ*, 849:143, November 2017.
- [6] D. Ruíz-Rodríguez, L. A. Cieza, J. P. Williams, J. J. Tobin, A. Hales, Z. Zhu, K. Mužić, D. Principe, H. Canovas, A. Zurlo, S. Casassus, S. **Perez**, and J. L. Prieto. The ALMA early science view of FUor/EXor objects - II. The very wide outflow driven by HBC 494. *MNRAS*, 466:3519–3532, April 2017.
- [7] A. Zurlo, L. A. Cieza, J. P. Williams, H. Canovas, S. **Perez**, A. Hales, K. Mužić, D. A. Principe, D. Ruíz-Rodríguez, J. Tobin, Y. Zhang, Z. Zhu, S. Casassus, and J. L. Prieto. The ALMA early science view of FUor/EXor objects - I. Through the looking-glass of V2775 Ori. *MNRAS*, 465:834–842, February 2017.
- [8] L. Galbany, L. Mora, S. González-Gaitán, A. Bolatto, H. Dannerbauer, Á. R. López-Sánchez, K. Maeda, **Pérez, S.**, M. A. Pérez-Torres, S. F. Sánchez, T. Wong, C. Badenes, L. Blitz, R. A. Marino, D. Utomo, and G. Van de Ven. Molecular gas in supernova local environments unveiled by EDGE. *MNRAS*, 468:628–644, June 2017.
- [9] G. van der Plas, C. M. Wright, F. Ménard, S. Casassus, H. Canovas, C. Pinte, S. T. Maddison, K. Maaskant, H. Avenhaus, L. Cieza, S. **Perez**, and C. Ubach. Cavity and other radial substructures in the disk around HD 97048. *A&A*, 597:A32, January 2017.
- [10] S. Marino, L. Matrà, C. Stark, M. C. Wyatt, S. Casassus, G. Kennedy, D. Rodriguez, B. Zuckerman, S. **Perez**, W. R. F. Dent, M. Kuchner, A. M. Hughes, G. Schneider, A. Steele, A. Roberge, J. Donaldson, and E. Nesvold. Exocometary gas in the HD 181327 debris ring. *MNRAS*, 460:2933–2944, August 2016.
- [11] L. A. Cieza, S. Casassus, J. Tobin, S. P. Bos, J. P. Williams, S. **Perez**, Z. Zhu, C. Caceres, H. Canovas, M. M. Dunham, A. Hales, J. L. Prieto, D. A. Principe, M. R. Schreiber, D. Ruiz-Rodriguez, and A. Zurlo. Imaging the water snow-line during a protostellar outburst. *Nature*, 535:258–261, July 2016.
- [12] G. van der Plas, C. M. Wright, F. Ménard, S. Casassus, H. Canovas, C. Pinte, S. T. Maddison, K. Maaskant, H. Avenhaus, L. Cieza, S. **Perez**, and C. Ubach. A cavity and further radial substructures in the disk around HD 97048. *ArXiv e-prints*, September 2016.

- [13] M. Montesinos, S. **Perez**, S. Casassus, S. Marino, J. Cuadra, and V. Christiaens. **Spiral Waves Triggered by Shadows in Transition Disks.** *ApJL*, 823:L8, May 2016.
- [14] S. Marino, S. Casassus, **Perez, S.**, W. Lyra, P. E. Roman, H. Avenhaus, C. M. Wright, and S. T. Maddison. **Compact Dust Concentration in the MWC 758 Protoplanetary Disk.** *ApJ*, 813:76, November 2015.
- [15] S. Casassus, S. Marino, **Pérez, S.**, P. Roman, A. Dunhill, P. J. Armitage, J. Cuadra, A. Wootten, G. van der Plas, L. Cieza, V. Moral, V. Christiaens, and M. Montesinos. **Accretion Kinematics through the Warped Transition Disk in HD142527 from Resolved CO(6–5) Observations.** *ApJ*, 811:92, October 2015.
- [16] **Perez, S.**, A. Dunhill, S. Casassus, P. Roman, J. Szulágyi, C. Flores, S. Marino, and M. Montesinos. **Planet Formation Signposts: Observability of Circumplanetary Disks via Gas Kinematics.** *ApJL*, 811:L5, September 2015.
- [17] M. Montesinos, J. Cuadra, **Perez, S.**, C. Baruteau, and S. Casassus. **Protoplanetary Disks Including Radiative Feedback from Accreting Planets.** *ApJ*, 806:253, June 2015.
- [18] H. Canovas, **Perez, S.**, C. Dougados, J. de Boer, F. Ménard, S. Casassus, M. R. Schreiber, L. A. Cieza, C. Caceres, and J. H. Girard. **The inner environment of Z Canis Majoris: High-contrast imaging polarimetry with NaCo.** *A&A*, 578:L1, June 2015.
- [19] S. Casassus, C. M. Wright, S. Marino, S. T. Maddison, A. Wootten, P. Roman, **Pérez, S.**, P. Pinilla, M. Wyatt, V. Moral, F. Ménard, V. Christiaens, L. Cieza, and G. van der Plas. **A Compact Concentration of Large Grains in the HD 142527 Protoplanetary Dust Trap.** *ApJ*, 812:126, October 2015.
- [20] S. Marino, **Perez, S.**, and S. Casassus. **Shadows Cast by a Warp in the HD 142527 Protoplanetary Disk.** *ApJL*, 798:L44, January 2015.
- [21] **Perez, S.**, S. Casassus, F. Ménard, P. Roman, G. van der Plas, L. Cieza, C. Pinte, V. Christiaens, and A. S. Hales. **CO Gas Inside the Protoplanetary Disk Cavity in HD 142527: Disk Structure from ALMA.** *ApJ*, 798:85, January 2015.
- [22] G. van der Plas, S. Casassus, F. Ménard, **Perez, S.**, W. F. Thi, C. Pinte, and V. Christiaens. **Spatially Resolved HCN J = 4-3 and CS J = 7-6 Emission from the Disk around HD 142527.** *ApJL*, 792:L25, September 2014.
- [23] A. S. Hales, I. De Gregorio-Monsalvo, B. Montesinos, S. Casassus, W. F. R. Dent, C. Dougados, C. Eiroa, A. M. Hughes, G. Garay, D. Mardones, F. Ménard, A. Palau, **Pérez, S.**, N. Phillips, J. M. Torrelles, and D. Wilner. **A CO Survey in Planet-forming Disks: Characterizing the Gas Content in the Epoch of Planet Formation.** *AJ*, 148:47, September 2014.
- [24] V. Christiaens, S. Casassus, **Perez, S.**, G. van der Plas, and F. Ménard. **Spiral Arms in the Disk of HD 142527 from CO Emission Lines with ALMA.** *ApJL*, 785:L12, April 2014.
- [25] S. Casassus, G. van der Plas, **Perez, S.**, W. R. F. Dent, E. Fomalont, J. Hagelberg, A. Hales, A. Jordán, D. Mawet, F. Ménard, A. Wootten, D. Wilner, A. M. Hughes, M. R. Schreiber, J. H. Girard, B. Ercolano, H. Canovas, P. E. Román, and V. Salinas. **Flows of gas through a protoplanetary gap.** *Nature*, 493:191–194, January 2013.

- [26] L. A. Cieza, S. Lacour, M. R. Schreiber, S. Casassus, A. Jordán, G. S. Mathews, H. Cánovas, F. Ménard, A. L. Kraus, **Pérez, S.**, P. Tuthill, and M. J. Ireland. **Sparse Aperture Masking Observations of the FL Cha Pre-transitional Disk.** *ApJL*, 762:L12, January 2013.
- [27] S. Casassus, **Pérez M., S.**, A. Jordán, F. Ménard, J. Cuadra, M. R. Schreiber, A. S. Hales, and B. Ercolano. **The Dynamically Disrupted Gap in HD 142527.** *ApJL*, 754:L31, August 2012.
- [28] **Pérez M., S.** and K. M. Blundell. **SS433's circumbinary ring and accretion disc viewed through its attenuating disc wind.** *MNRAS*, 408:2–8, October 2010.
- [29] **Pérez, S.**, S. Casassus, J. R. Cortés, and J. D. P. Kenney. **Near-infrared imaging and spectroscopy of the nuclear region of the disturbed Virgo cluster spiral NGC4438.** *MNRAS*, 400:2098–2110, December 2009.
- [30] **Pérez M., S.** and K. M. Blundell. **Inflow and outflow from the accretion disc of the microquasar SS433: UKIRT spectroscopy.** *MNRAS*, 397:849–856, August 2009.
- [31] F. J. Clarke, A. J. Gosling, S. Doolin, P. Goodall, **Pérez, S.**, P. Pattinson, R. Makin, and K. M. Blundell. **The GlobalJetWatch spectrographs: a fibre-fed spectrograph for small telescopes.** In *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, volume 7014 of *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, page 5, July 2008.