

# Sebastian Perez | CV

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FONDECYT postdoc and young researcher at MAD

## Summary

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I currently study how circumplanetary disks and planet formation affect the transport of matter through disk gaps –which directly affects the stellar accretion and evolution– and the observability of forming planets with ALMA. I also investigate the distribution of gas and dust inside these protoplanetary gaps and cavities using ALMA interferometry of transition disks, as well as hydrodynamical simulations of planet-disc interactions. Prior to this, my first postdoc was on accretion disks around black holes with jets (microquasars), where I played a part on commissioning and developing the GlobalJetWatch network of telescopes. My PhD thesis was on accretion disks and the relation between inflow and outflow physics (accretion-jet connection) in stellar mass black holes. I completed my PhD at the Astrophysics Department at the University of Oxford.

## Education

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### University of Oxford

*Doctor of Philosophy, PhD*

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

Supervisor: Prof. Katherine M. Blundell

**Oxford, UK**

2006–2009

### Universidad de Chile

*Licenciatura en Ciencias mención Astronomía, BSc*

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

**Santiago, Chile**

2002–2005

## Research Experience

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### Universidad de Chile

*Postdoc FONDECYT, MAD2*

Topic: Observations and hydrodynamical simulations of on-going planet formation

**Santiago, Chile**

2014–

### Millenium ALMA Disk Nucleus, U. Chile

*MAD Postdoc*

Topic: Protoplanetary disks research with ALMA

**Santiago, Chile**

2011–2014

### University of Oxford

*Postdoctoral fellow*

Topic: Research on accretion disks around black holes with jets (microquasars).

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

**Oxford, UK**

2009–2011

## Publication list

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See attached file or [ADS library](#).

## Selected conferences and workshops with contributions

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**2015:**

- Disc Dynamics & Planets, Larnaka, Cyprus.  
Talk: “Circumplanetary disc signposts in gas kinematics”
- Transition Disks and Planet Formation, Lorentz Workshop, Leiden, Netherlands.  
Talk: “Observability of circumplanetary discs via ALMA gas kinematics”

**2014:**

- Protoplanetary disks and the planets they form, MAD workshop, Calan, Chile  
Chair and coordinator for the “Modelling and Observability of Planet Formation” session
- Characterising planetary systems across the HR diagram, Cambridge, UK  
Poster: “HD142527’s gap depth”
- Herbig Ae/Be stars: the missing link in star formation, ESO Santiago, Chile  
Talk: “HD142527 transition disk”

**2013:**

- Transformational Science with ALMA: From Dust to Rocks to Planets, Hawaii, USA  
Poster: “HD142527’s gap depth”

**2012:**

- ALMA Early Science conference, Puerto Varas, Chile  
Talk: “ALMA Cycle 0 observations of gas in HD142527’s gap”

## Recent Telescope Time as PI

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**2014 – 2015:**

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

**NACO/VLT:** Circumstellar environ of ZCMA in high contrast polarimetry. 4h

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

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

## Research Grants

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**2015:** FONDEQUIP to commission a GPU Cluster for Hydro 3D simulations (PI-ed along with S. Casassus).

**2014:** FONDECYT Postdoctoral fellowship

## Selected Teaching and Advicing Experience

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**U. de Chile:** Christian Flores, Marcelo Barraza (undergraduate research adviser)

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

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

## Tools and Technical Expertise

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**Numerical Simulations:** Grid-based hydrodynamic simulations with FARGO2D, FARGO3D.

**Radiative Transfer:** Dust continuum and line emission calculations with RADMC3D. Listed as developer in C. Dullemond's RADMC3D website.

**Image synthesis:** CASA 4.3

**Programming languages:** Python, Perl, C, Fortran, html5, css.

## Other Highlights

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- Observer on Gemini (North, South), Magellan, CTIO 4m, UH-88, VLA, SAAO 2m, GJW 1m
- Referee on ApJ Letters and A&A.
- Advanced English and Native Spanish.

## Art + Astronomy, Art + Science

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**AATS 2014:** Director of the Art, Astronomy, Technology and Society initiative.

- Art+Astronomy Day at MAC. Series of talks and activities for artists, educators, students and general public.
- Art+Astronomy Incubator. Coordinator of 4 projects lead by artists and astronomers.

**AATS 2013 "El Origen del Sistema Solar":** Immersive exhibit at Contemporary arts museum. Full November.

## Recent Outreach activities (2013–)

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- Writer of the children's book about astronomy "Bitácora Planetaria", to be released in Sept 2015 with LOM Ediciones.
- Invited to give a workshop at the UNESCO's "Learning through Art" week. Coyhaique, Chile.
- More than 30 outreach talks at schools (all ages) since 2013, in Chile (24), UK (4), South Africa (1) and India (2).
- Invited to four radio shows at Radio U. de Chile.

## References

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### Prof. Dr. Katherine M. Blundell

- Astrophysics sub-department
- University of Oxford
- [kmb@astro.ox.ac.uk](mailto:kmb@astro.ox.ac.uk)

### Prof. Dame Jocelyn Bell-Burnell

- Astrophysics sub-department
- University of Oxford
- [Jocelyn.BellBurnell@physics.ox.ac.uk](mailto:Jocelyn.BellBurnell@physics.ox.ac.uk)

### Prof. Dr. Simon Casassus

- Departamento de Astronomía
- Universidad de Chile
- [simon@das.uchile.cl](mailto:simon@das.uchile.cl)

## Publications list (peer-reviewed papers)

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- [1] **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. *accepted for publication in ApJL*, May 2015.
- [2] M. Montesinos, J. Cuadra, **Perez, S.**, C. Baruteau, and S. Casassus. Protoplanetary Disks Including Radiative Feedback from Accreting Planets. *ApJ*, 806:253, June 2015.
- [3] 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.
- [4] S. Casassus, C. Wright, S. Marino, S. T. Maddison, A. Wootten, P. Roman, **Perez, S.**, P. Pinilla, M. Wyatt, V. Moral, F. Menard, V. Christiaens, L. Cieza, and G. van der Plas. A compact concentration of large grains in the HD142527 protoplanetary dust trap. *Submitted to ApJ*, May 2015.
- [5] S. Casassus, S. Marino, **Perez, S.**, P. Roman, A. Dunhill, P. 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. *Submitted to ApJ*, May 2015.
- [6] 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. *Submitted to ApJ*, May 2015.
- [7] S. Marino, **Perez, S.**, and S. Casassus. Shadows Cast by a Warp in the HD 142527 Protoplanetary Disk. *ApJL*, 798:L44, January 2015.
- [8] **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.
- [9] 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.
- [10] 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.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] S. Casassus, **Perez 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.
- [15] **Perez 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.
- [16] **Perez, 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.
- [17] **Perez 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.
- [18] F. J. Clarke, A. J. Gosling, S. Doolin, P. Goodall, **Perez, 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.