

Natalia Gómez-Pérez

Curriculum Vitae

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Address: Departamento de Física, Universidad de los Andes,
Bogotá, Colombia.

Phone: +57(1) 313 3239645

Email: ngomez@uniandes.edu.co

WWW: <http://wwwprof.uniandes.edu.co/~ngomez/>

Summary

My research focusses on the application of magnetohydrodynamic theory of astrophysical systems to address problems of current interest in the field of planetary science. My expertise is specifically in the development of computational models to predict, understand, and visualize dynamo processes in deep planetary interiors and understand their relationship with exterior magnetic fields. Prior to beginning a faculty appointment at the Universidad de los Andes (Colombia) in October 2010, I was the MESSENGER fellow where I examined the properties of terrestrial planet magnetic fields with an emphasis on Mercury. I have authored 36 published papers and abstracts on geodynamics, listed on page 3. As an assistant professor I am supervising graduate and undergraduate student research (currently, for 3 students) and developing the curriculum for a new department of geology and geophysics, designing and teaching up to 2 undergraduate courses per semester in both physics and geosciences.

Education

University of Alberta
2007
Physics Department
Ph.D. in Geophysics

11322-98th Avenue
Edmonton, AB
Canada

Universidad de los Andes
2002
Departamento de Física
B.Sc. in Physics, minor in mathematics
Departamento de Música
B.Mus. in music performance(unfinished)

Cra 1E N° 18A-10
Bogotá, D.C.
Colombia

Professional experience

- **Profesor Asistente**

Departamento de Física
Universidad de los Andes

Cra 1E N° 18A-10
Bogotá, D.C.
Colombia

(October 2010 – Present)

I design, write and teach the content of courses for a new geosciences program at Universidad de los Andes which has 70 undergraduate majors to date and started in winter 2011. I am currently supervising research by 2 masters and 1 undergraduate student. In 3 semesters, I have developed and taught 2 core geoscience courses and taught 2 courses in basic physics in association with the Department of Physics, with a typical course load of 2 courses per semester.

- **MESSENGER postdoctoral fellow**

Department of Terrestrial Magnetism
Carnegie Institution of Washington

5241 Broad branch Road N.W.
Washington, DC
U.S.A.

(October 2007 – October 2010)

Member of the Atmosphere and Magnetosphere Discipline Group (AMDG) and Geophysics group of the MESSENGER science team. We found the most likely generation mechanism for magnetic field in the planet Mercury. I collaborated with University of Alberta, in Edmonton Canada; the Max Plank Institute for Solar System Research, in Katlenburg-Lindau, Germany; UCLA, in Los Angeles, USA; as well as the space physics group at Braunschweig Technical University, in Braunschweig, Germany, where I trained and supervised a Ph.D. student.

- **Research/Teaching assistant**

*Department of Physics
University of Alberta*

11322 -89th Avenue
Edmonton, AB
Canada

(September 2002 – September 2007)

I taught laboratory sessions for first and second year physics courses; I graded assignments for physics, engineering and geophysics classes; and I assisted with geophysical field work. I also participated in one field season of the magnetotellurics group. As a research assistant I worked with Dr. Moritz Heimpel developing numerical simulations of planetary cores. We investigated the mechanism for generation of magnetic field in Uranus and Neptune as well as in Jupiter and Saturn as a part of my Ph.D. dissertation research.

- **Teaching assistant**

*Departamento de Física
Universidad de los Andes*

Cra 1E N° 18A-10
Bogotá, D.C.
Colombia

(September 1999 – June 2002)

I assisted in grading assignments and conducting tutorial sessions for physics and engineering courses from first to fourth year undergraduate level.

- **Instructor**

Escuela de Formación musical

Cra 11 Bis N° 127-77
Bogotá, D.C.
Colombia

(September 2000 – June 2002)

I taught violin to students from ages 4 to 20 years.

Honors and Awards

- NSF travel award to attend the XI Symposium of SEDI in Kunming, China, August 2008.
- MESSENGER postdoctoral fellow, Carnegie Institution of Washington, from October 2007 to October 2010.
- IGR Travel Award. University of Alberta, May 2004, December 2005 and July 2006.
- FGSR Travel Award. University of Alberta. July 2006.
- Best Student Paper (GP session) AGU meeting Spring 2004.
- Ernest Kanasewich Memorial Graduate Scholarship. University of Alberta, Fall 2003.
- Golden Bell Jar Graduate recruitment scholarship in physics. University of Alberta, Fall 2002.
- Mención honorífica. Honourable mention for the undergraduate final project. Universidad de Los Andes. May 2002.
- Student Recognition Award. XIX Congreso Nacional de Física. December 2001.
- Tuition Scholarship, Beca de cortesía. Universidad de los Andes. From winter 1998 to summer 2002.

Publications

Refereed papers

1. Heimpel, M. H., J. M. Aurnou, F. M. Al-Shamali, and N Gomez Perez (July 2005). A numerical study of dynamo action as a function of spherical shell geometry. *Earth and Planetary Science Letters* **236**(1-2), 542–557.
2. Gomez-Perez, N. and M. Heimpel (2007). Numerical models of zonal flow dynamos: an application to the ice giants. In: *Geophysical and Astrophysical Fluid Dynamics*, pp.371–388.
3. Kabin, K., M. H. Heimpel, R. Rankin, J. M. Aurnou, N Gomez Perez, J. Paral, T. I. Gombosi, T. H. Zurbuchen, P. L. Koehn, and D. L. DeZeeuw (2008). Global MHD modeling of Mercury’s magnetosphere with applications to the MESSENGER mission and dynamo theory. *Icarus* **195**(1), 1–15.
4. Gomez-Perez, N., M. Heimpel, and J. Wicht (2010). Effects of a radially varying electrical conductivity on 3D numerical dynamos. *Physics of the Earth and Planetary Interiors* **181**, 42–53.
5. Gomez-Perez, N. and S. C. Solomon (2010). Mercury’s weak magnetic field: A result of magnetospheric feedback? *Geophysical Research Letters* **37**, L20204.
6. Gomez-Perez, N. and J. Wicht (2010). Behavior of planetary dynamos under the influence of external magnetic fields: Application to Mercury and Ganymede. *Icarus* **209**(1), 53–62.
7. Heimpel, M. and N. Gomez-Perez (2011). On the relationship between zonal jets and dynamo action in giant planets. *Geophysical Research Letters* **38**, L14201.
8. Heyner, D., J. Wicht, N. Gomez-Perez, D. Schmitt, H.-U. Auster, and K.-H. Glassmeier (2011). Evidence from Numerical Experiments for a Feedback Dynamo Generating Mercury’s Magnetic Field. *Science* **334**(6063), 1690–1693.

Theses

1. Gomez Perez, N. (2002). “Sonoluminiscencia”. Bachelor’s thesis. Departamento de Física, Universidad de los Andes, Colombia.
2. Gomez Perez, N. (2007). “Planetary magnetic fields in the solar system: A numerical study of dynamo models”. PhD thesis. University of Alberta, Canada.

Conference abstracts and proceedings

1. Aurnou, J. M., M. H. Heimpel, N. Gomez Perez, and F. Al-Shamali (May 2004). Radius Ratio Effects on Rotating Convection and Dynamo Action. *AGU Spring Meeting Abstracts*, A8.
2. Gomez Perez, N., M. Heimpel, and J. Aurnou (May 2004). Varying the core radius ratio in dynamo models: Effect of the initial seed field. *AGU Spring Meeting Abstracts*, A7.
3. Gomez Perez, N. and M. Heimpel (Dec. 2005). Zonal flow dynamos. *AGU Fall Meeting Abstracts*, A8.
4. Heimpel, M., K. Kabin, N. Gomez Perez, and J. Aurnou (Dec. 2005). Simulation of MESSENGER flybys using plausible numerical dynamo models of Mercury’s liquid core. *AGU Fall Meeting Abstracts*, A5.
5. Kabin, K., M. Heimpel, R. Rankin, N. Gomez-Perez, T. I. Gombosi, T. H. Zurbuchen, P. Koehn, and J. Aurnou (2006). Global MHD modeling of Mercury’s magnetosphere with applications to the MESSENGER mission. In: *36th COSPAR Scientific Assembly*. Vol. 36, pp.223.
6. Gomez Perez, N. and M. Heimpel (Dec. 2007). Zonal Flow Dynamos. *AGU Fall Meeting Abstracts*, A916.
7. Gómez-Pérez, N. (2008). Influence of an external field on a self-sustained dynamo: An application to Mercury. In: *37th COSPAR Scientific Assembly*. Vol. 37, pp.1049.
8. Gómez-Pérez, N. (2008). Numerical dynamo models with variable electrical conductivity: An application to the magnetic fields of the giant planets. In: *37th COSPAR Scientific Assembly*. Vol. 37, pp.1050.
9. Gómez-Pérez, N., J. Wicht, and M. Heimpel (Dec. 2008). Effects of external imposed magnetic fields on 3-dimensional self-sustained numerical dynamos. *AGU Fall Meeting Abstracts*, A1772.
10. Heimpel, M. and N. Gomez Perez (Dec. 2008). Numerical models of the transition from zonal flow to dynamo action in Jupiter and Saturn. *AGU Fall Meeting Abstracts*, B1276.
11. Gomez-Perez, N. (May 2009). Possible factors affecting magnetic field generation in Mercury. *AGU Spring Meeting Abstracts*, A1.
12. Gomez Perez, N. and S. C. Solomon (Dec. 2009). Magnetospheric feedback effects on Mercury’s internal dynamo. *AGU Fall Meeting Abstracts*, A1199.

13. Gómez-Perez, N. and J. Wicht (Mar. 2009). Magnetic Field at Mercury: Effects of External Sources on Planetary Dynamos. In: *Lunar and Planetary Institute Science Conference Abstracts*. Vol. 40. Lunar and Planetary Institute Science Conference Abstracts, pp.1634.
14. Heimpel, M. and N. Gomez Perez (May 2009). Modelling the effect of radially variable conductivity on dynamo action and zonal flow in the Giant planets. *AGU Spring Meeting Abstracts*, A3.
15. Heimpel, M. H. and N. Gomez Perez (Dec. 2009). Numerical models of zonal flow and dynamo action in Jupiter and Saturn (Invited). *AGU Fall Meeting Abstracts*, A9.
16. Barnes, R., V. S. Meadows, S. D. Domagal-Goldman, R. Heller, B. Jackson, M. Lopez-Morales, A. Tanner, N. Gomez-Perez, and T. Ruedas (Dec. 2010). Habitability of Planets Orbiting Cool Stars. *ArXiv e-prints*. eprint: 1012.1883.
17. Gómez-Pérez, N., M. Heimpel, and J. Wicht (2010). Magnetic field generation in light-element-rich iron cores. In: *38th COSPAR Scientific Assembly*. Vol. 38, pp.758.
18. Gomez Perez, N., D. Heyner, J. Wicht, S. C. Solomon, and K. Glassmeier (Dec. 2010). Magnetospheric Feedback Effects on Mercury's Dynamo. *AGU Fall Meeting Abstracts*, B1006.
19. Gomez-Perez, N. and M. Lopez-Morales (Sept. 2010). Predicted dynamos for terrestrial extra-solar planets and their influence in habitability. In: *European Planetary Science Congress 2010*, pp.299. eprint: 1011.5798.
20. Gomez-Perez, N. and S. C. Solomon (Sept. 2010). Mercury's Weak Magnetic Field: Result of Magnetospheric Feedback? In: *European Planetary Science Congress 2010*, pp.298.
21. Heimpel, M. H., N. Gomez Perez, and J. M. Aurnou (Dec. 2010). The dynamical structure of giant planets. *AGU Fall Meeting Abstracts*, B1009.
22. Gomez-Perez, N. and D. Heyner (Oct. 2011). La generación de campo magnético en Mercurio. In: *XXIV Congreso Nacional de Física*, pp.GF-048.
23. Heyner, D., J. Wicht, N. Gomez-Perez, D. Schmitt, H.-U. Auster, and K.-H. Glassmeier (Oct. 2011). The Feedback Dynamo of Mercury. In: *EPSC-DPS Joint Meeting 2011*, pp.1162.
24. López-Morales, M., N. Gómez-Pérez, and T. Ruedas (Dec. 2011). Magnetic Fields in Earth-like Exoplanets and Implications for Habitability around M-dwarfs. *Origins of Life and Evolution of the Biosphere* **41**, 533–537. eprint: 1107.2804.
25. Gómez-Pérez, N. and M. Heimpel (May 2012). The structure of deeply seated high latitude jets in numerical models of giant planets. *EGU Meeting Abstracts*, EGU2012-11344.
26. Heyner, D., J. Wicht, N. Gomez-Perez, D. Schmitt, H.-U. Auster, and K.-H. Glassmeier (May 2012). The structure of deeply seated high latitude jets in numerical models of giant planets. *EGU Meeting Abstracts*, EGU2012-5986.

References

- **Moritz H. Heimpel**
Associate Professor of Geophysics
Department of Physics
University of Alberta
Edmonton, Alberta
Canada T6G 2J1
Phone: +1(780) 492-3519
Fax: +1(780) 492-0714
E-Mail: mheimpel@phys.ualberta.ca
url: <http://www.ualberta.ca/~mheimpel/>
- **Catherine Louise Johnson**
Professor
Department of Earth and Ocean Sciences
University of British Columbia
6339 Stores Road
Vancouver BC
Canada V6T 1Z4.
Phone: +1(604) 827 3480
E-mail: cjohnson@eos.ubc.ca
url: <http://www.eos.ubc.ca/~cjohnson/>
- **Sean C. Solomon**
Research Staff Member and Director Emeritus
Department of Terrestrial Magnetism
Carnegie Institution of Washington
5241 Broad Branch Road, NW
Washington, DC 20015-1305
United States of America
Phone: +1(202) 478 8850
fax: +1 (202)478 8821
E-mail: scs@dtm.ciw.edu