

# Sebastián Bustamante Jaramillo

## Curriculum Vitae

Bello, Colombia  
Avenida 21 # 57 AA 65  
☎ +057 3108992409  
☎ +057 (4) 4820138  
✉ macsebas33@gmail.com



*I am a physicist with a strong interest in astrophysics, specifically in cosmology. I have always thought humanity's understanding the large-scale universe through science is like a bacteria colony trying to build a complete map of the earth or even more. I am looking forward to cooperate and get involve with high quality research teams in order to contribute my humble grain of sand to this grand and exciting enterprise called science. If I were asked to introduce myself in four words, they would be astrophysics-programming-swimming-guitar.*

## GENERAL INFORMATION

**Name** Sebastián Bustamante Jaramillo.  
**Date of Birth** 20<sup>th</sup> June, 1990.  
**Place of Birth** Maceo - Colombia.  
**Nationality** Colombian.  
**Marital Status** Single.  
**Identification** c.c. 1128400433 .  
**Address** Avenida 21 # 57 AA 65, Bello - Colombia.  
**Home tel.** +057 (4) 4820138 .  
**Mobile** +057 3108992409 .  
**e-mail** macsebas33@gmail.com.  
**Inst. e-mail** sbustama@pegasus.udea.edu.co.

## EDUCATION

**2001-2006** **High School Diploma**, *Institución Educativa Cisneros*, Cisneros, Colombia.  
**2007-2012** **B.Sc. in Physics**, *Physics Institute, Universidad de Antioquia*, Medellín, Colombia.  
**Thesis** "The place of the Milky Way and Andromeda in the cosmic web".  
**Description** This study is aimed to characterize the local environment of Local Group (LG)-like systems from dark matter simulations of the large-scale universe. Using two different types of simulations, an unconstrained simulation (Bolshoi project) and a set of constrained simulations (CLUES project), it is first constructed a LG-like sample based upon observational constrains on the kinematic properties and isolation criteria of the real LG, along with the results of the CLUES simulations. By using a tensorial scheme based upon the peculiar velocity field of the dark matter, the V-web scheme, it is classified the local environment of systems in each simulation. Finally, it has been found that LG-like systems lies preferentially in sheet-like regions, furthermore a significant environmental bias for the total mass and the specific energy. No correlations have been found for the specific angular momentum and other studied properties.  
**Advisor** Jaime E. Forero-Romero, Ph.D.

## ADDITIONAL EDUCATION

**2008** **Extension Course of Planetary Sciences**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

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## FIELDS OF INTEREST

Cosmology. Large-scale structure formation. Galaxy astrophysics. Planetary interior. Numerical simulations. Computational astrophysics. General astrophysics and physics. Programming.

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## LANGUAGES

**Spanish** Native speaker.  
**English** Good.

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## COMPUTER SKILLS

**Systems** Linux, MSWindows.  
**Development** C/C++, Python, Basic, TI Basic, shell scripts.  
**Software** Mathematica, LaTeX, gnuplot, Gadget.  
**Tools** N-body simulations, SPH, MonteCarlo, Finite Differences, Numerical integrators, Audio processing.  
**Repositories** A list of my projects can be found in my *github* page: <https://github.com/sbustamante>.

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## HONOURS, AWARDS, AND ACCOMPLISHMENTS

**2006** **The best graduate of the promotion**, *Institución Educativa Cisneros*, Cisneros, Colombia.  
**2007/II** **Honour Roll**, *Universidad de Antioquia*, Medellín, Colombia.  
**2009/I** **Honour Roll**, *Universidad de Antioquia*, Medellín, Colombia.  
**2009/II** **Honour Roll**, *Universidad de Antioquia*, Medellín, Colombia.  
**2012** **First Best Oral Presentation**, *II International Congress of Astrobiology*, Medellín, Colombia.

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## TEACHING

**Assistant Instructor** **Physics 1 (Newtonian Mechanics)**, **2013/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.  
**Assistant Instructor** **Computational Complement of Physics 2 (Electricity and Magnetism)**, **2013/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.  
**Assistant Instructor** **Computational Complement of Physics 3 (Oscillations and Waves)**, **2013/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.  
**Adjunct Professor** **Introductory Physics**, **2013/II**, *Faculty of Engineering, Universidad de Antioquia*, Medellín, Colombia.  
**Adjunct Professor** **Laboratory of Physics 1 (Newtonian Mechanics)**, **2013/II**, *Faculty of Engineering, Universidad de Antioquia*, Medellín, Colombia.

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## RESEARCH EXPERIENCE

**2010-2011** **Young Investigator Programme**, Fundamental of quantum mechanics, *Group of Atomic and Molecular Physics (GFAM), Committee for Research Development (CODI), Universidad de Antioquia*, Medellín, Colombia.  
**2011-2012** **Young Investigator Programme**, Thermal evolution of rocky exoplanets, *Group of Computational Physics and Astrophysics (FACom), Committee for Research Development (CODI), Universidad de Antioquia*, Medellín, Colombia.  
**August, 2012** **Research Internship**, *Physics Department, Universidad de los Andes*, Bogotá, Colombia.

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## PUBLICATIONS

- 1 *The influence of thermal evolution in the magnetic protection of terrestrial planets*, J.I. Zuluaga, **S. Bustamante**, P.A. Cuartas, J.H. Hoyos, *The Astrophysical Journal*, ApJ 770 23, 2013.
- 2 *The kinematics of the Local Group in a cosmological context*, J.E. Forero-Romero, Y. Hoffman, **S. Bustamante**, S. Gottloeber, G. Yepes, *The Astrophysical Journal Letters*, ApJL 767 L5, 2013.
- 3 *Habitability in binary systems*, P.A. Mason, J. Clark, P.A. Cuartas, J.I. Zuluaga, **S. Bustamante**, American Astronomical Society, AAS Meeting # 222, # 302.05, 2013.
- 4 *Habitability in binary systems: the role of UV reduction and magnetic protection*, J. Clark, P.A. Mason, J.I. Zuluaga, P.A. Cuartas, **S. Bustamante**, American Astronomical Society, AAS Meeting #222, #217.03, 2013.

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## PARTICIPATION IN EVENTS

- 1 (Poster) **PLYNET, Python Planetary Physics Package**, *II Colombian Congress of Astronomy and Astrophysics*, Bogotá, Colombia, 2010.
- 2 (Oral presentation) **Thermal evolution of rocky exoplanets**, *III International Congress of Formation and Modelling in Basic Sciences*, Medellín, Colombia, 2011.
- 3 (Oral presentation) **Numerical modelling of the interior and thermal evolution of habitable planets**, *II International Congress of Astrobiology*, Medellín, Colombia, 2012.
- 4 (Oral presentation) **The place of the Local Group in the cosmic web**, *III Colombian Congress of Astronomy and Astrophysics*, Bucaramanga, Colombia, 2012.

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## REFERENCES

- **Jaime E. Forero-Romero** (*Former Advisor*)  
Assistant Professor, Physics Department, Universidad de los Andes, Bogotá, Colombia.  
je.forero@uniandes.edu.co
- **Juan Carlos Muñoz-Cuartas**  
Assistant Professor, Physics Institute, Universidad de Antioquia, Medellín, Colombia.  
juancarlosmunozc@gmail.co
- **Carlos A. Vera-Ciro**  
Postdoctoral Researcher, Department of Astronomy, University of Wisconsin-Madison, Madison, Wisconsin, United States.  
ciro@astro.wisc.edu