Sebastián
Bustamante Jaramillo

Curriculum Vitae

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General Information

Name Sebastián Bustamante Jaramillo.

Date of Birth 20^{th} June, 1990.

Place of Birth Maceo - Colombia.

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Education

2006 **High School Diploma**, *Institución Educativa Cisneros*, Cisneros, Colombia.

2007-2013 **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.

Supervisor Prof. Dr. Jaime E. Forero-Romero

2015- **PhD in Astrophysics**, *Heidelberg University*, Heidelberg, Germany.

Supervisor Prof. Dr. Volker Springel

Additional Education

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

Fields of Interest

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

Languages

Spanish Native speaker.

English Fluent.

German Basic.

Computer Skills

Systems Linux, MSWindows.

Development C, Python, Bash.

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`.

Teaching

TA **Physics 1 (Newtonian Mechanics), 2013/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

TA **Computational Complement of Physics 2 (Electricity and Magnetism), 2013/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

TA **Computational Complement of Physics 3 (Oscillations and Waves), 2013/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Introductory Physics, 2013/II**, *Faculty of Engineering, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Laboratory of Physics 1 (Newtonian Mechanics), 2013/II**, *Faculty of Pharmaceutics Chemistry, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Introductory Physics, 2014/I**, *Faculty of Engineering, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Laboratory of Physics 1 (Newtonian Mechanics), 2014/I**, *Faculty of Pharmaceutics Chemistry, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Introductory Computation, 2014/II**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Computational Methods for Astronomy and Physics, 2014/II**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

Lect. **Computational Methods for Astronomy and Physics, 2015/I**, *Faculty of Exact and Natural Sciences, Universidad de Antioquia*, Medellín, Colombia.

Honours, Awards, and Accomplishments

2012 **First Best Oral Presentation**, *II International Congress of Astrobiology*, Medellín, Colombia.

2013 **Best physics graduate student**, *Universidad de Antioquia*, Medellín, Colombia.

2015 **DAAD PhD Scholarship**, Germany.

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.

Papers

2015 *Tensor anisotropy as a tracer of cosmic voids*, **S. Bustamante**, J.E. Forero-Romero, MNRAS 453 1 497, 2015. **ADS:** adsabs.harvard.edu/abs/2015MNRAS.453..497B

2013 *The kinematics of the Local Group in a cosmological context*, J.E. Forero-Romero, Y. Hoffman, **S. Bustamante**, S. Gottloeber, G. Yepes, ApJL 767 L5, 2013. **ADS:** adsabs.harvard.edu/abs/2013ApJ...767L...5F

2013 *The influence of thermal evolution in the magnetic protection of terrestrial planets*, J.I. Zuluaga, **S. Bustamante**, P.A Cuartas, J.H. Hoyos, ApJ 770 23, 2013. **ADS:** adsabs.harvard.edu/abs/2013ApJ...770...23Z

Conference Papers

2014 *The Local Group in an explicit cosmological context*, J.E. Forero-Romero, Y. Hoffman, **S. Bustamante**, S. Gottloeber, G. Yepes, XIV Latin American Regional IAU Meeting, Revista Mexicana de Astronomía y Astrofísica (Serie de Conferencias) Vol. 44, pp. 118-118, 2014. **ADS:** adsabs.harvard.edu/abs/2014RMxAC..44..118F

2013 *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. **ADS:** adsabs.harvard.edu/abs/2013AAS...22230205M

2013 *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. **ADS:** adsabs.harvard.edu/abs/2013AAS...22221703C

Participation in Events

2010 (Poster) **PLYNET, Python Planetary Physics Package**, *II Colombian Congress of Astronomy and Astrophysics*, Bogotá, Colombia, 2010.

2011 (Oral presentation) **Thermal evolution of rocky exoplanets**, *III International Congress of Formation and Modelling in Basic Sciences*, Medellín, Colombia, 2011.

2012 (Oral presentation) **Numerical modelling of the interior and thermal evolution of habitable planets**, *II International Congress of Astrobiology*, Medellín, Colombia, 2012.

2012 (Oral presentation) **The place of the Local Group in the cosmic web**, *III Colombian Congress of Astronomy and Astrophysics*, Bucaramanga, Colombia, 2012.

2014 (Oral presentation) **The fractional anisotropy as a tracer of cosmic voids**, *IV Colombian Congress of Astronomy and Astrophysics*, Pasto, Colombia, 2014.

Schools and Workshops

2014 **First Andean School of Astronomy and Astrophysics** (EAAA), Quito, Ecuador, 2014.

Personal Activities

General programming. Swimming. Reading (specially science fiction). Playing guitar (amateur level and specially classical guitar). Hiking.