Dr César Simón López-Monsalvo AMInstP

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Born: January 21st, 1980—México D.F., México
Nationality: Mexican

Research interests

- Information Geometry.
- Differential Geometry.
- Mathematical Physics.
- Science Communication.

Work experience

2015 - present • Departamento de Energía, UAM-A. *CONACYT Professorship*, México D.F., México
2014-2016 • Instituto de Ciencias Nuclares, UNAM. *DGAPA Post-doctoral fellow*, México D.F., México
2012-2014 • Instituto de Ciencias Nuclares, UNAM. *CONACYT Post-doctoral fellow*, México D.F., México
2014 • Posgrado en Ciencias Físicas, UNAM. *Lecturer*, México D.F., México
2012 • VixTrend. *Programmer*, México D.F., México
2006-present • Facultad de Ciencias, UNAM. *Lecturer*, México D.F., México
2004-2006 • Facultad de Ciencias, UNAM. *Teaching Assistant*. México D.F., México

Education

2007-2011 • Ph.D. in Mathematics. Thesis title: "Covariant thermodynamics and relativity", supervised by Nils Andersson and James Vickers. arXiv:1107.1005
University of Southampton. Southampton, UK.
2006-2007 • M.Sc. in Quantum fields & fundamental forces. Thesis title: "Causal hierarchy and causal isomorphisms of space-time", supervised by Fay Dowker
University of London (Imperial College), London. London UK.
• Diploma Imperial College, **Imperial College London**, London UK.
2004-2006 • Diploma in Physics. Thesis title: "Ondas Gravitaciónales de colapso de núcleos estelares", supervised by William Lee
Instituto de Astronomía, UNAM. México D.F., México.
1999-2004 • B.Sc. in Physics, **Facultad de Ciencias, UNAM**. México D.F., México.

Grants and honours

2016 • SNI, México. Level 1 member
2014 • UNAM-DGAPA Post-doctoral Research Fellowship, México
2013 • 2012 IOP Gravitational Physics Group **Best Doctoral Thesis Prize**, UK
2012-2014 • CONACYT, México. Post-doctoral fellowship, México
2011 • Institute of Physics, London. Conference organization grant, Vorticity 2011, UK
2010 • University of Southampton, FSHS Doctoral research. **First prize award**, UK
2009 • University of Southampton. FESM Doctoral research. **First prize award**, UK
2007-2011 • CONACYT México Doctoral fellowship, México
• University of Southampton Ph.D complementary grant, UK
2006-2007 • CONACYT México Masters scholarship, México

Publications Total: 20 Citations: 105

Peer-reviewed and invited articles

2015 • Bravetti A, **López-Monsalvo C S** and Nettel F,"Conformal Gauge Transformations in Thermodynamics", *Entropy* Special Issue "Geometry in Thermodynamics" **17**(9), 6150-6168 (2015) arXiv:1506.07160 [math-ph]

• Bravetti A, **López-Monsalvo C S** and Nettel F, "Contact Symmetries and Hamiltonian Thermodynamics", *Annals of Physics*, **361**, 377-400, (2015). arXiv:1409.7340 [math-ph] **Featured in nLab**

• Bravetti A and **López-Monsalvo C S**, "Para-Sasakian Geometry in Thermodynamics Fluctuation Theory", *Journal of Physics A: Mathematical and Theoretical*, **48** 125206 (2015). arXiv:1408.5443 [math-ph]

2014 • Garcia-Pelaez, D and **López-Monsalvo C S**, "Infinitesimal Legendre Symmetry in the Geometrothermodynamics Programme", *Journal of Mathematical Physics*, **55** 083515, (2014)

• Bravetti A, **López-Monsalvo C S**, Nettel, F and Quevedo H, "Representation invariant Geometrothermodynamics: applications to ordinary thermodynamic systems", *Journal of Geoemetry and Physcs* **81** 1-9, http://dx.doi.org/10.1016/j.geomphys.2014.03.001, (2014)

• **López-Monsalvo C S**, "A two-fluid model for relativistic heat conduction", Procceedings of the V Leopoldo Garcia-Colin Meeting on Mathematical and Experimental Physics, AIP Conf Proc Series **1577** 178-180, (2014).

2013 • **López-Monsalvo C S**, Nettel F, Quevedo H, "Conformally invariant thermodynamics of a Maxwell-Dilaton black-hole", *General Relativity and Gravitation*, DOI:10.1007s10714-013-1604-z, (2013). arXiv:1209.4058 [gr-qc].

• Gutierrez-Pineres A C, **López-Monsalvo C S** and Nettel F, "Two-dimensional Einstein manifolds in geometrothermodynamics", *A*dvances in High Energy Physics, Volume 2013, Article ID 967618, DOI:10.11552013967618. arXiv:1303.3940 [Math-ph].

• Bravetti A, **López-Monsalvo C S**, Nettel F and Quevedo H, "The conformal metric structure of geometrothermodynamics", *Journal of Mathematical Physics* **54** 033513 (2013). DOI:10.10631.4795136. arXiv:1302.6928 [Math-ph].

2012 • Guitierrez-Pineres A C and **López-Monsalvo C S**, "A static axisymmetric exact solution of f(R)-gravity", *Physics Letters B* **718** 1493 (2013) DOI:10.1016j.physletb.2012.12.014, arXiv:1211.2285 [gr-qc].

• **López-Monsalvo C S** Nettel F and Sanchez A, "Comment on 'Geometrothermodynamics of a black hole in string theory"', *Brazilian Journal of Physics* **42** Issue 5, 422-424, DOI:10.1007s13538-012-0090-1, arXiv:1203.6444 [gr-qc].

2011 • Andersson N and **López-Monsalvo, C S**, "A consistent first order model for relativistic heat flow", *Classical and Quantum Gravity* **28** 195023, arXiv:1107.0165 [gr-qc].

2010 • **López-Monsalvo, C.S.**, "Heat conduction in relativistic systems: alternatives and perspectives" Invited article for the IoP Gravitational Physics Group newsletter, December 2010, arXiv:1011.6628 [gr-qc].

• **López-Monsalvo, C.S.** and Andersson N., "Thermal dynamics in General Relativity", *Proceedings of the Royal Society A* **467**:738-759, March 2011. arXiv:1006.2978 [gr-qc].

• Samuelsson, L., **López-Monsalvo, C.S.**, Andersson, N. and Comer, G., "Relativistic two-stream instability", *General Relativity and Gravitation* **42**: 413-433, arXiv:0906.4002 [gr-qc].

2009 • Mendoza, S., Hernandez, X., Rendon, P., **López-Monsalvo, C.S.** and Velasco-Segura, R., "The Connection Between Entropy and the Absorption Spectra of Schwarzschild Black Holes for Light and Massless Scalar Fields", *Entropy* (11): 17-31, arXiv:gr-qc/0701165.

2006 • Hernandez, X., **López-Monsalvo C.S.**, Mendoza, Sergio and Sussman, Roberto, "Some Statistical Mechanical Properties of Photon Black Holes", *Rev. Mex. Fis* **52** (6): 515-521, arXiv:gr-qc/0507022.

Pre-prints 3

• Bravetti A, **López-Monsalvo C S** and Quevedo H, "Maximally Symmetric Spacetimes Emerging from Thermodynamic Fluctuations", arXiv:1503.08358 [gr-qc]

• Bravetti A, **López-Monsalvo C S** and Nettel F, "Legendre Symmetry and First Order Phase Transitions", arXiv:1308.6740 [gen-ph]

• Guitierrez-Pineres A C, **López-Monsalvo C S** and Queved H, "Variational thermodynamics of relativistic thin disks", arXiv:1306.6591 [gr-qc]

Talks and contributions

2015 • "Emergent spacetimes from thermodynamic fluctuations", *III Taller de Gravitación, Física de Altas Energías y Cosmología*, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México, Cuernavaca, Mor., México.

• "Einstein-Gauss-Bonnet vacua from Information Geometry", *Seminario de Gravitación, Altas Energías y Cosmología*, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México, México D.F., México

2014 • "Covariant methods in relativistic thermodynamics", *X Mexican School on Gravitation and Mathematical Physics*, División de Gravitación y Física Matemática, Playa del Carmen, México

• "Covariant methods in relativistic thermodynamics", *Seminario del Departamento de Gravitación y Teoria de Campo*, Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, México D.F., México

• "Variational techniques in relativistic thermodynamics", *II Taller de Cosmología y Altas Energías*, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México, Cuernavaca Mor., México

• "Relativity, Thermodynamics and heat with some applications", *XII Reunión Anual de la DGFM*, CINVESTAV, Instituto Politéctnico Nacional, México D.F., México.

• "Challenges in a Geometric Formulation of Thermodynamics", *Seminario del Instituto de Ciencias Físicas*, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México, México D.F., México

2013 • "A variational approach to relativistic thermodynamics",*Seminario del Departamento de Física*, Universidad Autónoma Metropolitana, México D.F., México

• "Thermal dynamics in general relativity and the inertial properties of heat",*V Leopoldo Garcia-Colin Mexican Meeting on Mathematical and Experimental Physics*, El Colegio Nacional, México D.F., México

• "Thermal dynamics in general relativity and the inertial properties of heat", *Seminario del Instituto Avanzado de Cosmología*, Universidad Nacional Autónoma de México, México D.F., México

• "Thermal dynamics in general relativity and the inertial properties of heat", *Seminario del Departamento de Gravitación y Teoria de Campo*, Universidad Nacional Autónoma de México, México D.F., México

• "Análisis termodinámico de discos relativistas", *Seminario del Departamento de Ciencias Espaciales*, Instituto de GeoFísica, Universidad Nacional Autónoma de México, México D.F., México.

• "Subtleties in a thermodynamic analysis of a Maxwell-dilaton black hole",*Taller de teorias de dimensiones extra y cosmologia*, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México, Cuernavaca, Mor., México.

2012 • "Relativistic thermal dynamics and the inertial properties of heat", *Seminario de Altas Energás*, Instituto de Ciencias Nucleares e Instituto de Física, Universidad Nacional Autónoma de México, México D.F., México

•"Geometrothermodynamics",*High energy seminar*, KFKI Research Institute for Particle and Nuclear Physics. Budapest, Hungary.

•"Relativistic thermal dynamics and the inertial properties of heat",*High energy seminar*, KFKI Research Institute for Particle and Nuclear Physics. Budapest, Hungary.

•"Surface gravity of extremal dirty blackholes", *13th Marcel Grossmann Meeting* (MG'13). Stockholm, Sweden.

•"Geometrothermodynamics"*London Relativity and Cosmology Seminars* Queen Mary University of London. London, UK.

•"Geometrothermodynamics"*Theoretical Physics Seminar*, University of Nottingham. Nottingham, UK.

•"Geometrothermodynamics"*General Relativity Seminar*, University of Southampton. Southampton, UK.

•"Relativistic thermal dynamics and the inertial properties of heat",*Seminario de Física y Matematicas*, Universidad Iberoamericana. México D.F., México.

2011 •"Relativistic thermal dynamics and the inertial properties of heat", *Séminaire Informel des Jeunes*, Laboratoire de Physique Théorique d'Orsay, Université Paris-Sud XI. Orsay, France.

• "A classical variational approach to dissipation in general relativity", *NPPD*, University of Glasgow. Glasgow, UK.

2010 • "Relativistic thermal dynamics", *19th General Relativity and Gravitation Meeting*(GR'19) [Poster], México D.F., México.

• "Relativistic heat conduction", *FESM Showcase* [Poster], University of Southampton. Southampton, UK.

• "Thermal dynamics in general relativity", *BritGrav10*, Dublin City University. Dublin, Ireland.

• "Relativistic heat conduction", *London Relativity and Cosmology Seminars*, Queen Mary, Univer-

sity of London. London, UK.

• "Relativistic heat conduction", *DATA seminar*, Instituto de Astronomía, UNAM. M'exico D.F., México.

2009 • "Relativistic heat conduction", *Graduate students seminar*, Instituto de Matemáticas, UNAM. M'exico D.F., México.

2008 • "Multi-fluids and dissipation in general relativity",*UKCosmo*, Queen Mary, University of London. London, UK.

• "Multi-fluids and dissipation in general relativity", *General Relativity Seminar*, University of Southampton. Southampton, UK.

• "Covariant plane wave propagation in multi-fluids", *BritGrav8*, University of York. York, UK.

Teaching

2013-2016 • Lecturer, *Relatividad*, Facultad de Ciencias, UNAM.

2014 • Lecturer, *Relatividad General*, Posgrado en Ciencias Físicas (jointly with Roberto Sussman), UNAM.

2008-2011 • Course leader, *Mathematics and engineering workshop*, University of Southampton.

• Teaching Assistant, *Engineering maths*, University of Southampton.

2006 • Lecturer, *Funciones Especiales y Transformadas Integrales*, Facultad de Ciencias, UNAM.

2005 • Teaching Assistant, *Electromagnetismo*, Facultad de Ciencias, UNAM.

2004 • Teaching Assistant, *Mecánical Cuántica*, Facultad de Ciencias, UNAM.

Public engagement and outreach

2014 • Public Lecture at La Noche de las Estrellas: "La geometría de la ignorancia", November 2014, México D.F., México

• Public Lecture at Fiesta de las Ciencias y las Humanidades, UNAM: "De las estrellas a la geometría", October 2014, México D.F., México

• Coloquio de Divulgación at Instituto de Ciencias Nucleares, UNAM: "Irreversible", August 2014, México D.F., México

• Public Lecture at Colegio de Ciencias y Humanidades, Plantel Sur: "Geometría Natural", May 2014, México D.F., México

• Public Lecture at Sociedad Astronómica de México: "De las estrellas a la geometría", February 2014, México D.F., México

2013 • Public Lecture at La noche de las estrellas Public: "Gravedad, Geometría y Realidad" November 2013, México D.F., México

• Scientific host at La Noche de las Estrellas: "Exploradores extremos" November 2013, México D.F., México

• Panel speacker at Cine Club Ciencias Nucleares, October 2013, México D.F., México.

2012 • Scientific host at La noche de las estrellas: "El universo extremo" November 2012, México D.F., México.

• Public Lecture at 3er Aquelarre Matematico: "Geometry and Natural Symmetries". October 2012, México D.F., México.

• *Beautiful Science.* Science and Art exhibition. Scientific team funded by the Welcome Trust. June 2012, London, UK.

2011 • *I'm a scientist, get me out of here!* Copper zone at www.imascientist.org.uk. Online outreach event funded by the Wellcome Trust. Live questions and answer sessions. June 2011, London, UK.

2010-2011 • *Relativistic heat conduction* [First prize awards]. Research Showcases 2010 and 2011. Faculty of Engineering Science and Mathematics and Faculty of Social and Human Sciences, University of Southampton, Southampton, UK.

2008 • *Can you hear black holes?* Summer Science Exhibition. Royal Society of London, London, UK.

Organizing commettee

2011 • Organiser and Chair. Vorticity 2011. Half-day meeting on 'Vorticity on different scales'. Royal Astronomical Society, London, UK.

Academic Visits

2012 • KFKI Research Institute for Particle and Nuclear Physics, Wigner Institute. *Visitor Researcher* [3 weeks, contact: Prof. Lajos Diosi, Dr Peter Van and Dr Tamas Biro], Budapest, Hungary.

2011 • School of Mathematics, Queen Mary University of London. *Visitor Researcher* [6 months, contact: Dr Juan A Valiente-Kroon], London, UK.

2008 • Nordic Institute for Theoretical Physics. *Visitor Researcher* [3 weeks, contact: Dr Lars Samuelsson], Stockholm, Sweden.

Public service

- Member of the Evaluation Committee for Post-graduate grants, CONACYT, México.
- Referee for Classical and Quantum Gravity, IoP Science.
- Referee for General Relativity and Gravitation, Springer.
- Referee for European Physics Letters, IoP Science.
- Referee for Physica Scripta, IoP Science.

Computing

Advanced knowledge of: LaTeX, Maple, Linux.
Proficient in: C++, Fortran, Gnuplot, Mathematica, Adobe Photoshop, Adobe Illustrator, Inkscape.

Languages

Spanish: native speaker.
English: proficient.
French: basic.

Last updated: September 9, 2015