

Éric BUCHLIN

Born 16 August 1978, MULHOUSE, France

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Scientific interests

Physical processes in the solar corona and the heliosphere.
Statistical analysis of observations and numerical simulations data.
Magnetohydrodynamics, turbulence and intermittence.

Current position

Since 2008 CNRS Researcher at Institut d'Astrophysique Spatiale (IAS), Orsay, France.
Since 2014 MEDOC (CNES/CNRS-INSU/Université Paris-Saclay) Scientific Director.
Since 2016 SPICE Project Scientist, Solar Orbiter mission (ESA/NASA).

Employment history

2007–2008 Research assistant at IAS.
2006–2007 Research associate, Imperial College, London, UK, working with Peter Cargill.
2004–2006 Post-doctoral fellow, University of Florence, Italy, working with Marco Velli.
2001–2004 PhD thesis, under the supervision of Jean-Claude Vial (IAS, Univ. Paris Sud) and Marco Velli (University of Florence, Italy), on the subject *Signatures and models of small-scale turbulent coronal heating*.

Education

2014 Habilitation, Université Paris-Sud.
2004 PhD, Université Paris-Sud.
2000–2001 DEA (advanced graduate class) *Astrophysics and Instrumentation*, Univ. Pierre et Marie Curie, Paris.
1999–2000 Maîtrise (M.S.) Physics, Univ. Pierre et Marie Curie.
1998–1999 Licence (B.A.) Physics, Univ. Pierre et Marie Curie.
1998–2002 École Normale Supérieure (ENS), Paris.
1996–1998 Two-year preparation (mathematics, physics) for admission at ENS (competitive exam).
1996 Baccalauréat, Sciences.
Languages French : mother tongue; English : fluent; German and Italian.
Computer skills Programming in C, C++, Python, Fortran, IDL; parallel computing (MPI); \LaTeX , XHTML, CSS, XSLT. Unix system administration.

Awards and fellowships

2007–2008 Post-doctoral Fellowship from Centre National d'Études Spatiales.
2004–2006 European contract "Marie Curie" (5th Framework Program, Improving Human Potential), in the network *Theory, Observations and Simulations of Turbulence in Space Plasmas*.
2004 Young Scientist's Travel Award for Europeans (YSTA), to participate to the EGU assembly.
2002 Travel grant of the *Univ. Franco-Italienne* for completing PhD in both France and Italy.
2002–2004 Research and teaching grant (*allocation couplée* : PhD scholarship, with teaching duties), at Univ. Paris-Sud, Orsay.
1998–2002 Full scholarship at the École Normale Supérieure (ENS), Paris.

Selected publications

See full list at http://eric.buchlin.org/cv/pub_buchlin_en.pdf / Orcid : 0000-0003-4290-1897.

Buchlin, E. and Velli, M. (2007). Shell-models of RMHD turbulence and the heating of solar coronal loops. *Astrophys. J.*, 662, 701–714. doi :[10.1086/512765](https://doi.org/10.1086/512765)

Galtier, S. et **Buchlin, E.** (2007). Multiscale Hall-Magnetohydrodynamic Turbulence in the Solar Wind. *Astrophys. J.*, 656, 560. doi :[10.1086/510423](https://doi.org/10.1086/510423)

Verdini, A., Velli, M. and **Buchlin, E.** (2009). Turbulence in the sub-Alfvénic solar wind driven by reflection of low-frequency Alfvén waves. *Astrophys. J. Lett.*, 700, 39–42. doi :[10.1088/0004-637X/700/1/L39](https://doi.org/10.1088/0004-637X/700/1/L39)

Buchlin, E. (2011). Intermittent turbulent dynamo at very low and high magnetic Prandtl numbers. *Astron. Astrophys.*, 534, L9. doi :[10.1051/0004-6361/201117890](https://doi.org/10.1051/0004-6361/201117890)

Boutry, C, **Buchlin, E.**, Vial, J.-C. and Régnier, S. (2012). Flows at the Edge of an Active Region : Observation and Interpretation. *Astrophys. J.*, 752, 13. doi :[10.1088/0004-637X/752/1/13](https://doi.org/10.1088/0004-637X/752/1/13)

Joulin, V., **Buchlin, E.**, Solomon, J. and Guennou, C. (2016). Energetic characterisation and statistics of solar coronal brightenings. *Astron. Astrophys.*, 591, A148. doi :[10.1051/0004-6361/201526254](https://doi.org/10.1051/0004-6361/201526254)

Zambrana Prado, N. and **Buchlin, E.** (2019). Measuring relative abundances in the solar corona with optimised linear combinations of spectral lines. *Astron. Astrophys.*, 632, A20. doi :[10.1051/0004-6361/201834735](https://doi.org/10.1051/0004-6361/201834735)

SPICE consortium (including **Buchlin, E.**) (2020). The Solar Orbiter SPICE instrument. An extreme UV imaging spectrometer. *Astron. Astrophys.*, 642, A14. doi :[10.1051/0004-6361/201935574](https://doi.org/10.1051/0004-6361/201935574)

Janvier, M., Mzerguat, S., Young, P. R., **Buchlin, E.** et al. (2023). A multiple spacecraft detection of the 2 April 2022 M-class flare and filament eruption during the first close Solar Orbiter perihelion. *Astron. Astrophys.*, 677, A130. doi :[10.1051/0004-6361/202346321](https://doi.org/10.1051/0004-6361/202346321)

Teaching

Courses Taught

- 2011–** Lab work : Data analysis of the Sun by UV spectroscopy, for the course *Instrumentation, diagnostics, signal processing*, Master of Plasma Physics, Orsay (8 hr/yr).
- 2022** Solar Orbiter EUI and SPICE data analysis, Solar Orbiter School, Sète, France; SPICE data analysis, Solar Orbiter meeting, Belfast.
- 2021** Solar Orbiter remote-sensing data analysis, Solar Orbiter Les Houches Physics School (online).
- 2012–2015** Turbulence and Applications, Master of Plasma Physics, Orsay (15 hr/yr).
- 2009–2010** Solar physics, Master of Plasma Physics, Orsay (10 hr/yr).
- 2008–2017** Hands-on project for the course *Simulations numériques et calculs haute performance*, Astronomy doctoral school of Paris area (3 d/yr).
- 2008** Solar corona and wind heating, CNRS school on *Processus physiques dans l'héliosphère et contraintes observationnelles*, Cargèse, France (3 hr).
- 2006–2007** 3rd year physics laboratory : radiative transfer and turbulence in the atmosphere, Imperial College, London (65 hr).
- 2002–2004** Experimental physics, written exams, preparation for students' oral exams, 2nd year (128 hr).
- 2001** Scientific aid for primary school teachers (*La Main à la Pâte*) with 30 hours of experimental physics in class.
- 2000–2002** Private lessons (high school level).

PhD Students

- 2023–** Co-advisor, Alexis Blaise, Université Paris-Saclay, Saclay (avec A. Strugarek et M. Janvier)
- 2022–** Co-advisor, Slimane Mzerguat, Univ. Paris-Saclay, Orsay, France (with Miho Janvier).
- 2019–2022** Co-advisor, Guillaume Bernoux, University of Toulouse, France (advisors : Angélica Sicard and Miho Janvier).
- 2017–2020** Advisor, Natalia Zambrana Prado, Univ. Paris-Saclay, Orsay, France.
- 2016–2019** Advisor, Ping Zhang, Univ. Paris-Sud, Orsay.
- 2011–2015** Advisor, PhD of Vincent Joulin, Univ. Paris-Sud, Orsay, France.
- 2008–2012** Co-advisor, PhD of Céline Boutry, Univ. Paris-Sud, Orsay, France.

PhD examining committees

- 2023** External examiner, Andy Shu To, University College London, United Kingdom.
- 2016** Referee, Fulvia Pucci, Sapienza – Università di Roma, Italie.
- 2016** Invited member, Lina Hadid, Université de Paris-Saclay, Palaiseau, France.
- 2011** Examiner, Aurélien Canou, École Polytechnique, Palaiseau, France.

Post-doctoral collaborators

- 2020–2021** Natalia Zambrana Prado
- 2019–2020** Soumitra Hazra; Barbara Perri.

Other graduate students

- 2022** Slimane Mzerguat (M2) : composition with Solar Orbiter/SPICE, 5.5 months, with Miho Janvier.
- 2017** Natalia Zambrana Prado (M2) : spectroscopic diagnostics for Solar Orbiter/SPICE, 3 months.
- 2016** Co-advisor, Baptiste Meylheuc (M1) : coronal oscillations during solar eruptions, 4 months, with Miho Janvier.
- 2010** Advisor, internship of Selma Engin (M2) : automated detection of solar filaments, 4 months.

Undergraduate Students

- 2010** Advisor, Romain Faubert (lattice-Boltzmann MHD model, 1.5 months).
- 2009** Advisor, Jean Teyssandier (bottleneck effect in turbulence, 1.5 months).
- 2009** Advisor, Adrien Revel (automated detection of solar filaments, 1.5 months).
- 2008** Advisor, Kevin Olivier (turbulent MHD dynamo effect, 1.5 months).

Outreach

- 2015–** Creation of movies of the solar corona (SDO/AIA data from MEDOC), presented at : Fête de la science, Journées des Arts et de la Culture dans l'Enseignement Supérieur, JC2 CNES young researchers days, "An engineer, a project" (Cité des Sciences), "The Sun : living with our star" exhibition (Science Museum, London), Plasma Art and Sciences campus (Plas@Par, Centre Pompidou, Paris), Curiositas festival...
- 2012–** Talks in high schools, planetariums, astronomy clubs.
- 2011–** Various outreach activities for the laboratory's communication actions : publication of news on the website, visits and internships from schools, lab open day, movies from solar data...
- 2004** Public outreach coordination for IAS during the Venus Transit.
- 1999–2002** President of the amateur astronomy club of École Normale Supérieure.

Service

Referee for *Astrophys. J.*, *Astron. Astrophys.*, *Astrophys. J. Lett.*, *Nature Astron.*, *Nonlin. Proc. Geophys.*, *J. Turb.*, *Geophys. Astrophys. Fluid Dyn.*, *RAS Techn. & Instr.*, and conferences.

For Institut d'Astrophysique Spatiale

- 2024– Head of the Solar and Stellar Physics team.
- 2014–2022 Member (nominated), Laboratory Council.
- 2011– Co-coordinator, Communication and Outreach Committee.
- 2010– Member, Computing Resources Users Committee.
- 2010–2013 Member (elected), Laboratory Council.
- 2001–2004 Member (elected), Laboratory Council.
- 2001–2004 Involvement in observation campaigns at MEDOC (IAS) : planner for the SUMER and CDS instruments onboard SoHO.

For Centre National de la Recherche Scientifique (CNRS)

- 2019– Member, Scientific council of the national Sun-Earth programme (PNST/INSU).
- 2020–2021 Member, Scientific and technical committee for the renovation of the Nançay radioheliograph.
- 2014 Member, Coordination with Space Prospective advisory group (CNRS Astronomy & Astrophysics prospective).

For Université Paris-Sud and Université Paris-Saclay

- 2021– Member, Consultative commission of Université Paris-Saclay (CCUPS) 29-34.
- 2013–2015 Member, Consultative commission of university specialists (CCSU) 29-34.
- 2013 Vice-chair, selection committee for assistant professor position 34MCF505.

For Centre National d'Études Spatiales (CNES)

- 2013–2017 Member, Sun-Heliosphere-Magnetospheres advisory group.

For Commissariat à l'Énergie Atomique et aux Énergies Alternatives (CEA)

- 2018 Member, Selection committee for a researcher/engineer position at CEA/DRF/Irfu/AIM.

For the European Commission

- 2022 Evaluator for Horizon Europe – SPACE – Space Weather proposals.

Meetings : Scientific (SOC) or Local (LOC) Organization Committees

- 2024 SOC, PNST meeting, Marseille, France.
- 2023 National LOC, European Space Weather Week, Toulouse, France.
- 2022 Chair of LOC, Coronal Loops workshop, Paris (70 participants).
- 2022 SOC, session In-situ and remote sensing measurements of solar system plasmas, French Astronomy and Astrophysics Society (SF2A) meeting, Besançon, France.
- 2022 SOC, PNST meeting, Marseille, France.
- 2022 SOC, Solar Orbiter school, Sète, France.
- 2021 SOC, PNST Sun and Heliosphere session, SF2A meeting (online).
- 2021 SOC/LOC, Les Houches physics school on Solar Orbiter (online).
- 2020 SOC/LOC, Cool material in the solar corona at the time of Solar Orbiter, in honor of Jean-Claude Vial (cancelled).
- 2014 SOC, PNST meeting on data analysis tools for Solar Orbiter, Toulouse, France.
- 2013 LOC, Atomic physics, plasma spectroscopy, and solar physics from space : Celebrating the achievements of Alan Gabriel, Orsay, France.
- 2013 LOC, IAU S300 Nature of prominences and their role in Space Weather, Paris, France.

Responsibilities in professional Associations

- 2011–2014 Association Bernard Gregory; board member (representing MCFA).
- 2005–2017 Marie Curie Fellows Association (MCFA); board member (2007–2015), treasurer (2008–2015).

Research Programs and Internships

- 2022–** Member of the International Space Science Institute (ISSI) team “Solar sources and evolution of the Alfvénic slow wind” (PI : Raffaella D’Amicis and Marco Velli), Bern, Switzerland.
- 2007–2009** Member of the ISSI team “The role of spectroscopic and imaging data in understanding coronal heating” (PI : Susanna Parenti), Bern, Switzerland.
- 2005**
(3 months) Long-term participant in the program *Grand Challenge Problems in Computational Astrophysics*, Institute for Pure and Applied Mathematics, University of California, Los Angeles. Workshops on : *Astrophysical Fluid Dynamics, N-Body Problems, Relativistic Astrophysics, Transfer Phenomena*.
- 2001**
(3 months) *Statistical Properties of Solar Events Simulated by a Cellular Automaton*. Advisors : Sébastien Galtier and Jean-Claude Vial, IAS, Orsay. Numerical code, optimization, statistical analysis.
- 2000**
(6 months) *Recent Observations of an Equatorial Coronal Hole*. Advisor : Dr. Donald M. Hassler, Southwest Research Institute, Boulder, Colorado. Data calibration, reduction and analysis for a SOHO/SUMER observation campaign.
- 1999** (1 month) *Construction and Optimization of a Cylindrical Laser Beam to form Annular Optical Lattices*. Advisor : Philippe Verkerk, University of Lille, France.