Curriculum Vitae – Christian Möstl, Mag. Dr.

Research Associate & project PI in Space Weather and Heliophysics
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Personal Information

Name: Mag. Dr. Christian Möstl Nationality: Austrian

Main areas of research

I am a space scientist based in Graz, Austria and work on heliospheric weather forecasting - like meteorology, but in space. I study the interplanetary evolution, 3D structure and global shape of solar storms (coronal mass ejections, CMEs) with multi-platform in situ and imaging observations by SDO, SOHO, STEREO, Wind, ACE, Venus Express, MESSENGER, MAVEN, Parker Solar Probe, Solar Orbiter and Bepi Colombo with empirical, analytical and numerical modeling. I am also managing the most comprehensive catalog on CMEs observed in situ at https://helioforecast.space/icmecat. I played a large part in developing the new field of interpreting and modeling heliospheric imager observations (provided by STEREO, Solar Orbiter, Parker Solar Probe, or a future Lagrange mission to the L5 point), and I invented a new 3D CME flux rope model (3DCORE). Further, I work on algorithms for the real time prediction of the solar wind, the aurora and geomagnetically induced currents including machine learning. Plus, I like to think about the influence of stellar space weather on the atmospheres of exoplanets and the possible detection of life. Among other prizes I was awarded with the Arne Richter Award, the highest honor for young researchers from the European Geosciences Union.

Current position

2020 - : Research Associate & project PI, Space Research Institute (IWF), Austrian Academy of Sciences, **leading 2 Austrian Science Fund (FWF) projects**: *Modeling the magnetic cores of solar storms*, P31521-N27, *Enhanced lead time for geomagnetic storms,* P31659-N27; **co-lead of a** Solar Orbiter in situ science working group**.**

Former positions

2020: Research Associate & project PI, Technical University of Graz, Institute for Geodesy, leading 2 FWF projects: *Modeling the magnetic cores of solar storms*, P31521-N27, *Enhanced lead time for geomagnetic storms,* P31659-N27.

2014 - 2020: Research Associate & project PI, Space Research Institute (IWF), project: *The evolution of solar storms in the inner heliosphere,* Austrian Science Fund, P26174-N27.

2014 - 2017: Working package leader & local PI, Institute of Physics, University of Graz (UNI Graz), Austria. *HELCATS - Heliospheric Cataloguing Analysis and Techniques Service,* EU-FP7-SPACE.

2013 - 2014: Post-Doc, Institute of Physics, UNI Graz, Austria. *COMESEP - Coronal mass ejections and solar energetic particles,* EU FP7 - SPACE, PI: N. Crosby.

2012 - 2013: Marie Curie Fellow (Post-Doc), Institute of Physics, UNI Graz, Austria. *WILISCME: The relationship between white-light and in situ observations of coronal mass ejections,* Marie-Curie international outgoing fellowship (return phase), EU FP7 - PEOPLE, PI: C. Möstl

2011 - 2012: Marie Curie Fellow (Post-Doc), **Space Science Laboratory, University of California, Berkeley, USA,** *WILISCME,* Marie-Curie international outgoing fellowship, EU FP7 - PEOPLE, PI: C. Möstl, supervisor: J. G. Luhmann.

2011: Post-Doc, Institute of Physics, UNI Graz, Austria, project: *COMESEP - Coronal mass ejections and solar energetic particles,* EU FP7 - SPACE, PI: N. Crosby.

2010 - 2011: Post-Doc, IWF, Graz, Austria, *Magnetic clouds and their solar sources,* Austrian Science Fund, PI: H. Biernat. **2008 - 2009:** Doctoral Researcher, IWF, Graz, Austria, *Magnetic clouds and their solar sources,* Austrian Science Fund, PI: H. Biernat. **2007 - 2008:** Doctoral Researcher, IWF, Graz, Austria, *Multi-spacecraft studies of magnetic clouds*, funded by University of Graz, PI: C. Möstl.

Supervised young researchers: T. Amerstorfer (former Rollett), R. L. Bailey, A. J. Weiss, M. A. Reiss, U. V. Amerstorfer, M. Dumbovic, J. Donnerer, M. Kubicka, P. Boakes, O. Törmanen, D. Utz.

Academic education 2006-2009: PhD Study in natural sciences (physics, with distinction) at the UNI Graz, Thesis: *Modeling of magnetic clouds using multi-spacecraft observations*, supervisors: Helfried Biernat and Charles J. Farrugia (University of New Hampshire, USA). **1999-2005**: Study of physics at the UNI Graz, emphasis on astrophysics, with distinction; Master thesis: *Dynamics of small scale magnetic structures in the solar photosphere*, supervisor: Arnold Hanslmeier.

Publications

82 articles (15 as first author) in **internationally peer-reviewed scientific journals**, such as *Nature Communications, Astrophysical Journal Letters*, *Geophysical Research Letters,* etc.
h-index: 30, total citations: 2767, source: SAO/NASA ADS, February 2021.

Conferences

More than 200 posters and talks (author and co-author) at AGU, EGU, COSPAR, IUGG, SIP, ICS9, SOHO, and STEREO meetings. **Seminar talks** at Lockheed Martin Solar and Astrophysics Laboratory, CA, USA; NASA/Caltech Jet Propulsion Laboratory, CA, USA; Imperial College, UK.

Convener and Co-Convener of 9 sessions at international conferences (3 AGU, 3 EGU, 1 SHINE, ISEST workshop, 7th SIP workshop). Organizer of a CME workshop in Austria, 2011.

Most important invited talks (6 in total)

1. *Lectures from multipoint observations of ICMEs*, at The Sun 360, Kiel, Germany, 2011.
2. *Connecting directions, speeds and arrival times of 22 CMEs from the Sun to 1 AU,* at the European Geosciences Union (EGU) General Assembly, Vienna, 2014.
3. *Combining Heliospheric Imaging and in situ observations to constrain CME evolution*, at the 7th Solar Image Processing workshop, La Roche-en-Ardenne, Belgium, 2014.
4. *A new view of solar coronal mass ejections with the Heliophysics System Observatory*, EGU 2016.
5. *Predicting CME arrivals and their planetary impacts: a review of methods and results*, ESPM-15 Budapest, 2017.

Most important academic awards

1. **Arne Richter Award for Outstanding Young Scientists of the European Geosciences Union**. Open world-wide, 4 recipients each year in the geo-, space and solar system sciences. (2016)
2. Josef - Krainer Award for young researchers (federal state of Styria, Austria, 2011).

3. Award of the governor of Styria for young researchers (UNI Graz, 2008).
4. Young Scientist Outstanding Poster Presentation Award (European Geophysical Union, 2008).
Further recognitions: PRO SCIENTIA scholarship for interdisciplinary communication (Austria, 2008, 2009), Alumni of the month at the University of Graz (2016).

Most important peer review activities

1. Reviewer for NASA (ROSES) and NSF (SHINE), both USA, and the Czech Science Foundation.
2. Reviewer for the international journals: *Nature*, *The Astrophysical Journal, The Astrophysical Journal Letters, Journal of Geophysical Research, Geophysical Research Letters, Solar Physics, Annales Geophysicae, Journal of Space Weather and Space Climate, JASTP.*
3. Pre-Examiner of the PhD thesis of Alexey Isavnin, University of Helsinki, Finland (2014).
4. Student judge at AGU and EGU meetings.

Most important memberships in academic organizations

1. Member of AGU, EGU and the Planetary Society.
2. Member (2012-2014) of the Scientific Organizing Committee of the Varsiti/ISEST program.

Most important research projects

Total research budget as PI: 1.59 Mio. € (see my homepage for project websites)
1. *Enhanced lead time for geomagnetic storms*, Austrian Science Fund - stand alone project, duration: 2019-2023, budget: 376k €.
2. *Modeling the magnetic cores of solar storms*, Austrian Science Fund - stand alone project, duration: 2019-2022, budget: 353k €.
3. *The evolution of solar storms in the inner heliosphere,* Austrian Science Fund - stand alone project, duration: 2014-2017, budget: 447k €.
4. *HELCATS – Heliospheric Cataloguing, Analysis and Techniques,* EU FP7 - SPACE, 2014-2017, local PI with budget of 270k € (full budget: 2.5 Mio €, PI R. Harrison). https://www.helcats-fp7.eu
5. *WILISCME - The relationship between white-light and in situ observations of coronal mass ejections* Marie-Curie fellowship, European Union FP7-PEOPLE IOF, 2011-2013, 146k €.

Key international collaboration partners in the last 5 years

C.J. Farrugia, A. B. Galvin, N. Lugaz (University of New Hampshire, USA). J. A. Davies, R. A. Harrison, D. Barnes (Rutherford Appleton Laboratory, UK). B. Vršnak, M. Dumbovic (University of Zagreb, Croatia). E.K.J. Kilpua, S. W. Good (University of Helsinki, Finland). Y. D. Liu (Chinese Academy of Sciences, Beijing, China). A. Isavnin (KU Leuven, Belgium), M. Janvier (Université Paris-Sud, Orsay, France). M. L. Mays (NASA/Goddard Space Flight Center). E. Palmerio (Space Science Laboratory, UC Berkeley, CA, USA).

Public outreach

Interviews and articles in the Austrian national press and radio (e.g. Die Presse, Kurier, derStandard, orf.at, Kleine Zeitung, Terra Mater, Ö1, Ö3, Antenne), and international press (e.g. Australian Cosmos magazine, in the USA space.com, Popular Science magazine). I am an expert adviser for the Austrian Mint for coin designs about astrophysics, and I am a young science ambassador in Austria, visiting schools to advocate science for school-children. Further, I am a strong advocate of open science and women in STEM, and I run a twitter account https://twitter.com/chrisoutofspace with 1.2k followers where I comment on space weather science and publish experimental real-time predictions of the solar wind and the aurora for people from all over the world.