

Christoph Saulder

Curriculum Vitae

Research position

- 06/2020 – ongoing **Research fellowship**, Korea Astronomy and Space Science Institute, Daejeon, South Korea.
- 11/2017 – 11/2019 **Research fellowship**, Korea Institute for Advanced Study, Seoul, South Korea.
- 11/2014 – 10/2017 **various part and full time jobs in the industry**.
- 01/2014 – 10/2014 **PhD studentship**, European Southern Observatory, Garching bei München, Germany.
- 11/2011 – 10/2013 **PhD studentship**, European Southern Observatory, Santiago, Chile.

Higher Education

- 04/2010 – 03/2016 **PhD (Dr.rer.nat.) in Astronomy**, University of Vienna, graduated (grade A), topic of the PhD thesis: *Observational tests of an inhomogeneous cosmology*, supervisors: Werner Zeilinger, Steffen Mieske, and Eelco van Kampen.
- 10/2007 – 04/2010 **MSc (Mag.rer.nat.) in Astronomy**, University of Vienna, graduated with distinction, topic of the master thesis: *Dynamics of the Local Group in different theories of gravity*, supervisor: Christian Theis.
- 10/2004 – 08/2007 **BSc (Bakk.rer.nat.) in Astronomy**, University of Vienna, graduated with distinction, topic of the bachelor thesis: *Lie-Integrator*, supervisor: Rudolf Dvorak.
- 10/2004 – 04/2013 **BSc in Physics**, University of Vienna.

Publication record

h-index: 5

6 completed publications:

- 5 first author papers published in refereed journals (3 with ≥ 20 citations each)
- 1 author paper submitted
- 2 first author papers in preparation
- 2 first author conference proceedings paper

Awards and Funding

- 2011 Winner of an ESO studentship
- 2005-2009 3 times winner of a performance scholarship of the University of Vienna

Invited talks

- 08/07/2022 **The DESI Peculiar Velocity Survey and its Prospects for Cosmology**, Asia Pacific Center for Theoretical Physics, Pohang, Republic of Korea.
- 30/06/2022 **Designing the DESI peculiar velocity survey**, California Institute of Technology, Pasadena, USA.

- 17/06/2022 **The DESI peculiar velocity survey: from target selection to the first measurements**, *Lawrence Berkeley National Laboratory*, Berkeley, USA.
- 24/03/2022 **Galaxy scaling relations as distance indicators**, *University of Vienna*, Vienna, Austria.
- 09/03/2022 **The benefits and challenges of using photometric data for BAO peak measurements**, *University of Vienna*, Vienna, Austria.
- 03/03/2022 **Studying the BAO peak with more than just spectroscopic data**, *CosKASI ECR seminar*, online.
- 11/07/2019 **Measuring peculiar motions in the local universe**, *University of Bielefeld*, Bielefeld, Germany.
- 12/03/2019 **Placing limits on the backreactions from inhomogeneities using survey data**, *University of Cape Town*, Cape Town, South Africa.
- 28/02/2019 **Testing redshift-independent distance indicators with group catalogues**, *ICRAR/UWA*, Perth, Australia.
- 04/09/2018 **Using the fundamental plane to map peculiar motions in large-scale surveys**, *ESO*, Garching bei München, Germany.
- 03/12/2013 **Observational tests of an inhomogeneous cosmology**, *ESO*, Santiago, Chile.
- 16/04/2013 **Observational tests of an inhomogeneous cosmology**, *Vienna University of Technology*, Vienna, Austria.
- 02/10/2012 **Observational tests of an inhomogeneous cosmology**, *University of Valparaiso*, Valparaiso, Chile.
- 09/08/2012 **Observational tests of an inhomogeneous cosmology**, *University of Concepcion*, Concepcion, Chile.
- 12/10/2010 **Dynamics of the Local Group in different theories of gravity**, *Vienna University of Technology*, Vienna, Austria.

Conferences and Workshops

Invited talks

- 03/06/2022 **“Understanding DESI” & “Finding data within DESI” & main organiser**, *DESI Korea local workshop*, Daejeon, Republic of Korea.
- 14/03/2022 – **“Which red nuggets can DESI bring to the table?”**, *Cosmic Nuggets - A feast of compact and massive galaxies across the Universe*, Sexten, Italy.

Contributing talks

- 04/07/2022 – **“The DESI peculiar velocity survey”**, *Cosmology from Home 2021*, online.
- 15/07/2022
- 21/06/2022 – **“Identifying targets for the DESI peculiar velocity survey” & “Hunting for red nuggets in DESI” & session chair**, *DESI June 2022 Hybrid Collaboration Meeting*, Berkeley, USA.
- 24/06/2022
- 13/04/2022 – **“Challenges of BAO peak measurement using photometric data”**, *Meeting of the Korean Astronomical Society*, Busan, Republic of Korea.
- 15/04/2022
- 18/10/2021 – **“Using cross-correlations to recover the BAO peak in sparse spectroscopic surveys”**, *8th Korea-Japan workshop on Dark Energy*, online.
- 22/10/2021
- 13/10/2021 – **“The DESI peculiar velocity survey”**, *Meeting of the Korean Astronomical Society*, Seopjikoji, Republic of Korea.
- 15/10/2021
- 05/07/2021 – **“BAO peak measurements using photometric survey data”**, *Cosmology from Home 2021*, online.
- 16/07/2021
- 07/12/2020 – **“Peculiar velocities as a cosmological probe”**, *7th Korea-Japan Workshop on Dark Energy: Maeda’s Universe*, online.
- 10/12/2020

- 17/02/2020 – “**Searching for systematic biases in redshift-independent distance indicators**”, *Cosmic Flows, Large-scale Structure, & Visualisation*, Stellenbosch, South Africa.
21/02/2020
- 30/06/2019 – “**The fundamental plane and peculiar motions in the local universe**”, *Alpine Cosmology workshop*, La Berarde, France.
05/07/2019
- 22/04/2019 – “**Fundamental plane distances: providing observational data for cosmological tests**”, *CosKASI Conference 2019 - The Correlated Universe*, Seogwipo, South Korea.
27/04/2019
- 03/03/2019 – “**The fundamental plane as a probe for large-scale structure**”, *Cosmology on Safari*, Hluhluwe, South Africa.
09/03/2019
- 18/02/2019 – “**Exotic galaxies as tests for hydrodynamical simulations**”, *Linking galaxies from the Epoch of initial star-formation to today*, Sydney, Australia.
22/02/2019
- 04/11/2018 – “**Peculiar velocities derived from the Fundamental Plane**” & LOC member, *8th KIAS workshop on Cosmology and Structure Formation*, Seoul, South Korea.
09/11/2018
- 18/06/2018 – “**Further improving the Fundamental Plane with SDSS data**”, *Collaboration Meeting of the SDSS-IV*, Seoul, South Korea.
22/06/2018
- 28/05/2018 – “**Peculiar motions in observations & simulations**”, *VI Meeting on Fundamental Cosmology*, Granada, Spain.
30/05/2018
- 15/01/2018 – “**Peculiar motions and the fundamental plane**”, *7th Survey Science Group Workshop*, High1 resort, South Korea.
17/01/2018
- 03/07/2016 – “**Testing gravity with low dark matter galaxies**”, *Alpine Cosmology workshop*, Bolzano, Italy.
08/07/2016
- 20/07/2015 – “**Systematic variations of the Hubble flow**”, *Alpine Cosmology workshop*, Silvretta mountains, Austria & Switzerland.
24/07/2015
- 22/06/2015 – “**Systematic variations of the Hubble flow**”, *EWASS 2015 conference*, Tenerife, Spain.
26/06/2015
- 27/07/2012 – “**Observational tests of an inhomogeneous cosmology**”, *Cosmology Today workshop*, Santiago, Chile.
27/07/2012
- 10/06/2012 – “**Observational tests of an inhomogeneous cosmology**” & poster, *Dark Side of the Universe workshop*, Buzios, Brazil.
15/06/2012
- [Other contributions](#)
- 02/08/2022 – **Participant**, *IAUGA 2022 XXXIst General Assembly International Astronomical Union*, Busan, Republic of Korea.
11/08/2022
- 01/12/2021 – **Spotlight Talk “Cross-correlations in DESI-like simulations and in early DESI data”**, *December DESI 2021 Virtual Collaboration Meeting and Pre-meeting*, online.
10/12/2021
- 25/10/2021 – **Participant**, *A Discussion on the Cosmological Principle*, online.
28/10/2021
- 14/06/2021 – **Spotlight Talk “Galaxies, distances, motions, and gravity”**, *Summer DESI 2021 Virtual Collaboration Meeting*, online.
18/06/2021
- 02/11/2020 – **Participant**, *9th KIAS workshop on Cosmology and Structure Formation*, Seoul, Republic of Korea.
06/11/2020
- 24/08/2020 – **Participant**, *Cosmology from Home 2020*, online.
04/09/2020
- 16/10/2019 – **Poster “Comparing distances obtained from galaxy scaling relations with the help of group catalogues”**, *Meeting of the Korean Astronomical Society*, Seoul, South Korea.
18/10/2019
- 20/08/2018 – **Poster “Galaxies with low dark matter fractions” & Volunteer**, *XXXth General Assembly of the International Astronomical Union*, Vienna, Austria.
31/08/2018
- 15/07/2018 – **Poster “Moving beyond the traditional fundamental plane”**, *The Physics of Galaxy Scaling Relations*, Kingston, Canada.
20/07/2018

- 11/06/2018 – **Participant**, *Studying the Universe with GALaxy suRveys Revealing the Unlimited in ShangHai*, Shanghai, China.
15/06/2018
- 22/05/2018 – **Poster “Improving fundamental plane distance measurements”**, *Statistical challenges in 21st century cosmology*, Valencia, Spain.
25/05/2018
- 18/11/2013 – **Poster “The peculiar(?) case of [BHF2008] 19” & LOC member**, *Deconstructing Galaxies: Structure and Morphology in the Era of Large Surveys conference*, Santiago, Chile.
22/11/2013
- 22/07/2013 – **Poster “Observational tests of an inhomogeneous cosmology”**, *Ripples in the Cosmos conference*, Durham, UK.
26/07/2013
- 14/05/2012 – **Poster “Observational tests of an inhomogeneous cosmology”**, *Testing General Relativity with Astrophysical Systems conference*, Boston, USA.
17/05/2012
- 2005 – 2009 **LOC member**, *Second, Third, Fifth, and Sixth Vienna Central European Seminar on Particle Physics and Quantum Field Theory*, Vienna, Austria.
- 29/06/2006 **LOC member**, *First Vienna Seminar of Nobel Laureates 2006*, Vienna, Austria.

Invited research visits

- 07/07/2022 – Hosted by Stephen Appleby at *Asia Pacific Center for Theoretical Physics*, Pohang, Republic of Korea
08/07/2022
- 28/06/2022 Hosted by Barry Madore at *Carnegie Observatories*, Pasadena, USA
- 27/06/2022 – Hosted by Jae Hwan Kang at *California Institute of Technology*, Pasadena, USA
30/06/2022
- 16/06/2022 Hosted by Johannes Lange at *Stanford University*, Stanford, USA
- 13/06/2022 – Hosted by Alex Kim at *Lawrence Berkeley National Laboratory*, Berkeley, USA
17/06/2022
- 07/03/2022 – Hosted by Sabine Thater at *University of Vienna*, Vienna, Austria
25/03/2022
- 08/07/2019 – Hosted by Dominik Schwarz at *University of Bielefeld*, Bielefeld, Germany
12/07/2019
- 27/06/2019 – Hosted by Owain Snaith at *Paris Observatory*, Meudon, France
28/06/2019
- 11/03/2019 – Hosted by Alvaro Dombriz at *University of Cape Town*, Cape Town, South Africa
15/03/2019
- 25/02/2019 – Hosted by Claudia Lagos at *ICRAR/UWA*, Perth, Australia
28/02/2019
- 09/07/2018 – Hosted by Ian Steer at *NASA Extragalactic Database*, Toronto, Canada
13/07/2018
- 08/07/2015 – Hosted by Eelco van Kampen at *ESO*, Garching bei München, Germany
09/07/2015
- 20/10/2014 – Hosted by Remco van den Bosch *MPIA*, Heidelberg, Germany
21/10/2014
- 08/08/2012 – Hosted by Michael Felhauer at *University of Concepcion*, Concepcion, Chile
10/08/2012
- 10/05/2012 – Hosted by Igor Chilingarian at *Harvard-Smithsonian CfA*, Boston, USA
15/05/2012

Research Interests

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| Cosmology | Large-scale Structure, Baryonic Acoustic Oscillations, Peculiar Motions, Inhomogeneous cosmology |
| Extragalactic Astronomy | Early-type Galaxies, Red nuggets, Internal Kinematics of Galaxies, Surveys, Data Astronomy |
| Computational Astrophysics | Hydrodynamical Simulations, Stellar Dynamical Numerical Simulations |

Outreach and Press

- 11/10/2021 entry in the official DESI Blog about the DESI peculiar velocity survey; online
- 22/04/2016 “Long night of research” public outreach event - station “our solar system on small scales”; Vienna, Austria
- 30/10/2013 Experiments for children at the family day celebrating the 50th anniversary of ESO in Chile; Sanitago, Chile
- 10/10/2013 Educative workshop on “planets and rockets” with experiments for children at the National Science Fair; Sanitago, Chile
- 13/08/2013 Talk with experiments on “The solar system and beyond” for children at Deutsche Schule St. Thomas Morus; Sanitago, Chile
- 02/07/2013 Talk with experiments on “The solar system and beyond” for children at Colegio Dunastair; Sanitago, Chile
- 16/04/2013 Interview on the Austrian radio Ö1 announcement: <http://oe1.orf.at/programm/334457>
- 12/03/2013 Meeting with the Austrian Minister of Science at the Austrian embassy; Santiago, Chile
- 19/12/2012 Interview with me in the Austrian newspaper Kurier newspaper article: <http://kurier.at/chronik/oberoesterreich/sterne-nur-0-5-des-universums/2.182.065>
- 06/12/2012 Meeting with the Austrian President at ESO; Santiago, Chile press release: <http://www.eso.org/public/announcements/ann12097/>
- 23/11/2012 Guiding a group of Austrian journalists through the ESO premises; Santiago, Chile
- 10/11/2012 ESO outreach at 170th anniversary of the Univerdad de Chile on Cerro Calan; Santiago, Chile
- 16/11/2011 Meeting with a delegation of several members of the Austrian parliament at ESO; Santiago, Chile
- 15/06/2011 Public observations of the lunar eclipse at the Institute for Astronomy of the University of Vienna; Vienna, Austria
- 14/05/2011 Day of Astronomy at University of Vienna; Vienna, Austria

Observing experience

- 2021-2022 *DESI at the Mayall Telescope*, remote: 19 nights as Support Observing Scientist
- 2007 *photometry at Vienna Little Telescope*, on-site in Vienna: 1 night observations of variable stars and bright nearby galaxies

Technical projects

- 09/2012 *La Silla observatory*, Chile: Developing Python-scripts for the Wide-Field Imager to create health-check plots from the quality control pipeline and to send them to a static web page (with Fernando Selman)
- 07/2012 *Paranal observatory*, Chile: Creating shell-scripts to dynamical update the zero-points for several instruments, such as OmegaCam, VIMOS, and VIRCcam (with Steffen Mieske)

Computer skills

Programming and Script-languages **advanced skills:** Python, Fortran, SQL, LaTeX, MPI, C/C++, Pascal/Delphi, Bash-Shell, ABAP **basic skills:** Java, R, Basic, JavaScript, HTML, CSS, PHP, microcontroller programming

Software user experience Gnuplot, GIMP, Blender, Origin, NEMO, Topcat, SAO DS9, Galfit, MaximDL, Windows, Linux (Ubuntu, Fedora, SUSE), Office (MS, LibreOffice, Openoffice), SAP

Languages

- **German** (Native)
- **English** (Fluent)
- **Spanish** (Very good)
- **French** (Good)
- **Russian** (Moderate)
- **Korean** (Basics)

Complete publication list

Submitted papers

DESI collaboration including **Saulder, C.**: *Overview of the Instrumentation for the Dark Energy Spectroscopic Instrument* submitted to AJ. ADS-link: <https://ui.adsabs.harvard.edu/abs/2022arXiv220510939A/abstract>

Refereed papers

Saulder, C., Snaith, O. N., Park, C. & Laigle, C. : *Isolated dark matter deprived galaxies in hydrodynamical simulations: real objects or numerical artefacts?* in MNRAS, Volume 491, 1278pp. ADS-link: <https://ui.adsabs.harvard.edu/abs/2020MNRAS.491.1278S/abstract>

Saulder, C., Mieske, S., Zeilinger, W. W., & van Kampen, E.: *Hubble flow variations as a test for inhomogeneous cosmology* in Astronomy & Astrophysics, Volume 622, id.A83, 19 pp. ADS-link: <https://ui.adsabs.harvard.edu/abs/2019A%26A...622A..83S/abstract>

Saulder, C., van Kampen, E., Chilingarian, I., Mieske, S., & Zeilinger, W. W.: *The matter distribution in the local universe as derived from SDSS DR12 and 2MRS data* in publication in Astronomy & Astrophysics, Volume 596, id.A14, 33 pp. ADS-link: <https://ui.adsabs.harvard.edu/abs/2016A%26A...596A..14S/abstract>

Saulder, C., van den Bosch, R. & Mieske, S.: *Dozens of compact and high dispersion early-type galaxies in SDSS* in Astronomy & Astrophysics, Volume 578, id.A134, 36 pp. ADS-link: <https://ui.adsabs.harvard.edu/abs/2015A%26A...578A.134S/abstract>

Saulder, C., Mieske, S., Zeilinger, W. W., & Chilingarian, I.: *Calibrating the fundamental plane with SDSS DR8 data* in Astronomy & Astrophysics, Volume 557, id.A21, 36 pp. ADS-link: <https://ui.adsabs.harvard.edu/abs/2013A%26A...557A..21S/abstract>

Conference proceedings

Saulder, C.: *Exotic galaxies as tests for hydrodynamical simulations* in Linking Galaxies from the Epoch of Initial Star Formation to Today - Proceedings of the 2019 Elizabeth and Frederick White Research Conference held 18-22 February, 2019 ADS-link: <https://ui.adsabs.harvard.edu/abs/2019lgei.confE..75S/abstract>

Saulder, C., Mieske, S., & Zeilinger, W. W.: *Observational aspects of an inhomogeneous cosmology* in Proceedings of VIII International Workshop on the Dark Side of the Universe (DSU 2012) ADS-link: <https://ui.adsabs.harvard.edu/abs/2012dsu..workE..18S/abstract>

Papers in preparation

Saulder, C., et al.: *Target selection of the DESI peculiar velocity survey* in preparation.

Saulder, C., et al.: *Challenges with photometric BAO peak measurements* in preparation.

References

Changbom Park, *Korea Institute for Advanced Study*, e-mail: cbp@kias.re.kr, phone +82 2 958 3751, School of School of Physics, Korea Institute for Advanced Study, 85 Hoegiro, Dongdaemun-gu, Seoul 02455, Korea.

Steffen Mieske, *European Southern Observatory*, e-mail: smieske@eso.org, phone +56 22 463 3118, ESO Vitacura, Alonso de Cordova 3107, Vitacura, Casilla 19001, Santiago de Chile, Chile.

Eelco van Kampen, *European Southern Observatory*, e-mail: evkampen@eso.org, phone +49 89 3200 6875, ESO Headquarters, Karl-Schwarzschild-Str. 2, 85748 Garching bei München, Germany.

Owain Snaith, *Observatoire de Paris*, e-mail: owain.snaith@obspm.fr, phone +33 145077530, GEPI, Observatoire de Paris, Université PSL, CNRS, 5 Place Jules Janssen, 92190 Meudon, France .