

# Lukas Zehrer

## Education and Training

- Since 2017 **PhD in Astroparticle Physics**, *University of Nova Gorica (UNG)*, Slovenia, "Application of machine learning techniques for cosmic ray event classification and implementation of a real-time ultra-high energy photon search with the surface detector of the Pierre Auger Observatory".  
Supervisor: prof. dr. Serguei Vorobiov
- 2013 - 2017 **Master program Technical Physics**, *Vienna University of Technology*, Austria.  
2016 **Master Thesis**, *Vienna University of Technology*, Institute of High Energy Physics (HEPHY), "Search for Physics beyond the Standard Model with the CRESST Experiment".  
Supervisor: Univ.Prof. Dipl.-Phys. Dr.rer.nat. Jochen Schieck
- 2009 - 2013 **Bachelor program Technical Physics**, *Vienna University of Technology*, Austria.  
2004 - 2009 **High-school diploma**, *HTBLuVA St. Pölten (Technical College)*, Austria, Department for electronic engineering – telecommunications.

## Studentships, Grants, Funds

- 2018 **TOP Stipendium**  
TOP Stipendien Niederösterreich, NÖ Forschungs- und Bildungsges.m.b.H. (NFB)
- 2017 **Siegfried Ludwig-Fonds**

## Collaborations

- Since 2017 **Pierre Auger Collaboration**.  
2017 - 2020 **Cherenkov Telescope Array**.

## Collaboration Work and Observations

- 2021 **Pierre Auger Observatory**, *06<sup>th</sup> January - 22<sup>th</sup> January 2021*, Malargüe, Mendoza, Argentina, FD shift.  
Night shift, operating fluorescence detectors and LIDAR system via remote facility in Slovenia.<sup>1</sup>
- 2020 **Pierre Auger Observatory**, *11<sup>th</sup> June - 29<sup>th</sup> June 2020*, Malargüe, Mendoza, Argentina, FD shift.  
Night shift, operating fluorescence detectors and LIDAR system via remote facility in Slovenia.<sup>1</sup>
- 2018 **Pierre Auger Observatory**, *28<sup>th</sup> November - 14<sup>th</sup> December 2018*, Malargüe, Mendoza, Argentina, FD shift.  
Night shift, operating fluorescence detectors and LIDAR system on site.

<sup>1</sup> Online due to 2019-20 coronavirus pandemic

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## Workshops, Seminars, Conferences, Meetings and Summer Schools

- 2020 **Pierre Auger Collaboration Meeting**<sup>1</sup>, November 9<sup>th</sup> - 21<sup>st</sup>, 2020, Second Online Collaboration Meeting (OCM).  
Contributed with a scientific talk:  
"Update on the implementation of a "real-time" photon stream to AMON with a MVA"
- 2020 **Pierre Auger Machine Learning Days**<sup>1</sup>, November 3<sup>rd</sup> & 4<sup>th</sup>, 2020.  
Topics:
- Lectures
  - Hands-on Tutorials
  - Talks about recent progress in deep learning and applications in (astroparticle) physics
- 2020 **40th International Conference on High Energy Physics**<sup>1</sup>, 28<sup>th</sup> July - 6<sup>th</sup> August, 2020, [ichep2020.org](http://ichep2020.org), Contributed with a talk: "Multi-Messenger studies with the Pierre Auger Observatory" in track "08. Astro-particle Physics and Cosmology".  
(Prague, Czech Republic)
- 2020 **Big Data Science in Astroparticle Research**, February 17<sup>th</sup> - 19<sup>th</sup>, 2020, Aachen, Germany, Deep Learning & Open Data, Helmholtz Alliance for Astroparticle Physics.  
RWTH Aachen University, SuperC  
Topics:
- Hands-on Tutorials
  - Deep Learning
  - Open-Data – Software – Analysis
  - Actual developments
- 2019 **Pierre Auger Analysis Meeting**, June 24<sup>th</sup> - 28<sup>th</sup>, 2019, Nijmegen, Netherlands.  
Contributed with a scientific talk: "Developing a real-time photon stream for AMON"
- 2018 **Pierre Auger Collaboration Meeting**, November 11<sup>th</sup> - 16<sup>th</sup>, 2018, Malargüe, Mendoza, Argentina.  
Contributed with a scientific talk:  
"Development of a real-time photon stream for AMON and latest results"
- 2018 **INTERNATIONAL SCHOOL OF COSMIC-RAY ASTROPHYSICS**, August 1<sup>st</sup> - 7<sup>th</sup>, 2018, 91016 Erice, Italy,  
«MAURICE M. SHAPIRO» 21 st Course: Astroparticle Physics: yesterday, today, and tomorrow.  
Contributed with a scientific presentation of a poster:  
"Developing a real time photon search for AMON with the Pierre Auger Observatory"

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## Teaching Experience

### Teaching Assistant at the University of Nova Gorica:

2019 / 2020	Mathematical Physics I	Bachelor 1 <sup>st</sup> & 2 <sup>nd</sup> Year
	Elementary particle physics <sup>2</sup>	Bachelor 3 <sup>rd</sup> Year
2018 / 2019	Mathematical Physics I	Bachelor 2 <sup>nd</sup> Year
	Computerized data acquisition	Bachelor 2 <sup>nd</sup> Year
2017 / 2018	Mathematical Physics I	Bachelor 2 <sup>nd</sup> Year
	Computerized data acquisition	Bachelor 2 <sup>nd</sup> Year

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## Holiday Jobs

- 2013, 2010, 2009 **Constantia Teich GmbH**
- 2006 **Schubert Elektroanlagen**, electric installations
- 2005 **Spar-AG**, office work

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<sup>2</sup> Remote teaching via zoom and moodle/bbb due to 2019-20 coronavirus pandemic

## Skills, Interests, General

- Software C++, ROOT, fortran; gnuplot, bash Unix shell, LabVIEW, Linux (Ubuntu, in private);  $\LaTeX$ , vim, Libre Office and Microsoft Office; Machine learning: (NN, DNN, CNN, GCNN, RNN, hybrid MLE/DL method, GANs) basic experience with VISPA, Keras, TensorFlow
- Languages German (mother tongue), English (fluent), Slovene (basics, A2), Italian (basics)
- Others Driving licence – category B
- Living situation:
- o 2017 - 2020 in Slovenia
  - o Since 2020 in Italy
- Interests Privacy technology enthusiast; owner of two Linux phones (Librem 5 and Ubuntu Touch); science & technology; science communicator, social media; fight against pseudo-science and fake news; fitness, (team) sports; member of the management team of a sports club, hiking; reading; travelling;
- Since October 2018 member of the European Solidarity Corps
- Projects 2019 February - August, Organisation/Club: ŠKD Črn Plamen; social project: "Table soccer, more than just a game!" / "Namizni nogomet, več kot le igra!";
- Organizations which benefited from this project:
- o PUM-O
  - o CIRIUS Vipava
- Supported by:
- o European Solidarity Corps
  - o Bar Hiša Mladih Ajdovščina
  - o MC Hiša Mladih

## PhD Curriculum

2017/2018

- Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste, Italy
- o Statistical Methods in Astrophysics and Cosmology, prof. dr. Andrea Lapi
  - o High Energy Astrophysics, prof. dr. Annalisa Celotti
- University of Nova Gorica, Slovenia
- o Communication in science, prof. dr. Samo Stanič
  - o Seminar, prof. dr. Sandra Gardonio

2018/2019

- University of Nova Gorica, Slovenia
- o Contemporary cosmology, doc. dr. Gabrijela Zaharijas
  - o Astroparticle physics, doc. dr. Gabrijela Zaharijas
  - o Modern experimental methods in astroparticle physics, doc. dr. Sergey Vorobyev