FRANCESCA CAPEL

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EDUCATION

01/09/**2015** - present

Doctor of Philosophy (PhD)
KTH Royal Institute of Technology
- Supervised by Prof. Christer Fuglesang, Prof. Mark Pearce and Prof. Daniel J. Mortlock.
- Thesis title: *Identifying the origin of ultra-high-energy cosmic rays: novel instrumentation and analysis aspects.*
- Planned graduation in June 2020

01/09/**2012** - 31/08/**2013**

Master thesis (Erasmus Program)
École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- Supervised by Prof. Ivo Furno and Prof. Benoit Labit
- Thesis title: *Characterization of scrape-off layer plasma using Langmuir probes in the TCV tokamak.*
- Awarded the *European Master Certificate in Fusion Science and Engineering* by the FuseNet Association.

01/09/**2010** - 01/08/**2014**

Msci. (Hons.) Degree in Physics
Imperial College London, United Kingdom
- Graduated with First Class Honours.
- Specialized in Astrophysics, Plasma Physics, Space Physics and Cosmology.

RESEARCH POSITIONS

01/09/**2014** - 31/08/**2015**

Young Graduate Trainee
ESTEC, European Space Agency (ESA), The Netherlands
- Testing and calibration of a novel, highly miniaturized radiation monitor for space applications.

01/07/**2009** - 31/08/**2009**

Nuffield Science Bursary holder
Cardiff University, United Kingdom
- Based in the Electrical engineering department.
- Design and testing of a near-field microwave microscope.
- Received Gold CREST award.

PUBLICATIONS

I have a total of **8** publications in refereed academic journals, including papers with the full JEM-EUSO Collaboration author list. In this section I list only publications that I have lead and/or made substantial contributions to. I also list relevent conference proceedings to highlight my contributions as part of the JEM-EUSO Collaboration.
Link to full publication list on Google Scholar: https://scholar.google.com/citations?user=jKM43oUAAAAJ).

Selected publications

1. **Capel, F.** & Mortlock, D. J., 2019, Impact of using the ultra-high-energy cosmic ray arrival energies to constrain source associations. *Monthly Notices of the Royal Astronomical Society*, 484, 2324, 10.1093/mnras/stz081.
2. **Capel, F.** et al., 2018, Mini-EUSO: A high resolution detector for the study of terrestrial and cosmic UV emission from the International Space Station. *Advances in Space Research*, 62, 2954, 10.1016/j.asr.2017.08.030.
3. Belov, A., Bertaina, M. **Capel, F.*** et al., 2018, The integration and testing of the Mini-EUSO multi-level trigger system. *Advances in Space research*, 62, 2966, 10.1016/j.asr.2017.10.044.
   *** Capel, F.** is corresponding author, but author list is alphabetically ordered.

Under review

4. **Capel, F.** et al., Mini-EUSO (Extreme Universe Space Observatory) data acquisition and control software. Under review with the *Journal of Astronomical Telescopes and Instrumentation*. Submitted in July 2019, arXiv:1907.04938 .

Selected conference proceedings

5. **Capel, F.** et al., 2017, Mini-EUSO flight software and operations on ISS. *Proceedings of the 35th International Cosmic Ray Conference (ICRC 2017)*, PoS, 454.
6. **Capel, F.** et al., 2017, The Mini-EUSO multi-level trigger algorithm and its performance. *Proceedings of the 35th International Cosmic Ray Conference (ICRC 2017)*, PoS, 453.

AWARDS

15/01/2019	Shortlisted as one of four finalists for the American Statistical Association's *Best Astrostatistics Student Paper Award.*
31/08/2018	TeVPA award for *Excellent Young Scientists*, 500 EUR.
01/12/2014	FuseNet Association *European Master Certificate in Fusion Science and Engineering*.
30/09/2009	Gold CREST award (https://www.crestawards.org/crest-gold).

GRANTS

Grants awarded for conferences, short research visits and equipment.

26/06/2019	**9 800 SEK** from Jubileumsanslaget for travel to the JSM conference, main applicant .
08/05/2019	**15 000 SEK** from Gålöstiftelsen for travel to the EPS-HEP conference, main applicant.
28/06/2018	**18 900 SEK** from Signeuls Stiftelsen for travel to the TeVPA conference, main applicant.
23/11/2017	**50 000 SEK** from Alexandra och Bertil Gyllings Stiftelesen for research visits and equipment related to the Mini-EUSO project, co-applicant with Christer Fuglesang.
22/02/2017	**2 700 SEK** from the Swedish National Space Board for travel to the SRS meeting, main applicant.

SCIENTIFIC SERVICES

- Referee for the *Monthly Notices of the Royal Astronomical Society* journal.
- Advocate for reproducible, open-source research and programming, active on GitHub (www.github.com/cescalara).
- Organizer of the 18th JEM-EUSO Collaboration Meeting, Stockhom 7th-11th December 2015.

INVITED TALKS

30/07/2019 **American Statistical Association - Joint Statistical Meetings, Denver**
Impact of using the ultra-high-energy cosmic ray arrival energies to constrain source associations.

13/07/2019 **European Physical Society - High Energy Physics, Ghent**
Multi-messenger astroparticle physics through hierarchical modelling.

16/11/2018 **Bayes Forum, Max Planck Institute for Astrophysics, Munich**
A hierarchical model for the energies and arrival directions of ultra-high-energy cosmic rays.

28/02/2018 **Research Seminar, University of Turin**
Scientific goals of the Mini-EUSO mission.

09/06/2017 **Science Coffee, ESTEC, European Space Agency, Noordwijk**
The Mini-EUSO instrument.

OTHER TALKS

04/04/2019 **IMAGINE Consortium workshop, Nijmegen**
Connecting UHECR theory to data via hierarchical modelling.

15/11/2018 **CRC 1258 working group, Max Planck Institute for Extraterrestrial Physics, Munich**
Impact of using the ultra-high-energy cosmic ray arrival energies to constrain source associations.

25/10/2018 **Extreme objects working group, Oskar Klein Center, Stockholm**
A hierarchical model for the sources of ultra-high-energy cosmic rays.

31/08/2018 **TeV Particle Astrophysics, Berlin**
Connecting UHECR theory to data with Bayesian hierarchical models.

01/12/2015 **Partikeldagarna, Uppsala**
Towards a space-based cosmic ray observatory.

SCHOOLS & COURSES

60 ECTS of graduate-level courses at KTH and Stockholm University in *Advanced Astrophysics*, *Frequentist Statistical Methods*, *Bayesian Statistics for Astronomers and Physicists*, *Quantum Field Theory* and *General Relativity*.

Other courses

- Proposal writing workshop, Technische Universität München, 11-14/08/2019.
- CERN School of Computing, Universidad Politécnica de Madrid, 27/08/2017 - 09/09/2017.
- Robust Chip Inc. TCAD sensor simulation workshop, ESA/ESTEC, 15-16/04/2015.
- Geant4-DNA radiation simulation workshop, ESA/ESTEC, 07/11/2014.
- Space Systems Engineering course organized by Southampton University, ESA/ESTEC, 14-16/10/2014.

TEACHING & SUPERVISION

Teaching assistant for the *Radiation, Protection, Dosimetry and Detectors* and *Modern Physics* courses at KTH Royal Institute of Technology during the autumn semester of 2015 and 2016.

Erasmus student theses from the University of Turin

- D. D'Ago, *Simulations of UHECR induced air showers in ESAF*, 31/08/2017.
- S. Durando, *Data analysis for the EUSO-SPB mission*, 31/08/2017.
- A. Liberatore, *Optimization of the L2 trigger algorithm for Mini-EUSO*, 31/08/2016.

Bachelor student theses as part of the MIST student CubeSat project

- C. Eriksson & V. Minoz, *Development of a Helmholtz coil for the MIST satellite*, 27/05/2019.
- M. Al-Janabi & L. Fischer, *A subsystem simulator for the MIST satellite*, 27/05/2019.

Bachelor student theses at the KTH Department of Physics

- F. Hülphers, *Identification of UHE cosmic rays using neural networks*, 31/05/2018.
- P. Bühlmann & J. Sigvant, *Simulation study of meteors for Mini-EUSO*, 31/05/2017.

OUTREACH

20/08/2019	Press release on the KTH website (in Swedish) for the launch of the Mini-EUSO experiment on-board the Soyuz MS-14 rocket to the International Space Station. link: https://www.kth.se/forskning/artiklar/svensk-mjukvara-skickas-till-rymden-1.919615.
30/11/2018	*Gravitational waves*, popular science seminar for undergraduate students at KTH as part of the *Modern Physics* course.
12/09/2018	*Exploring the universe with ultra-high-energy cosmic rays*, KTH Library public seminar series, filmed and published online. link: https://www.youtube.com/watch?v=HK0hus6qBXQ, **675 views**.
02/02/2018	Interview with *Rymdstyreslen (Swedish National Space Agency)* space blog (in Swedish), filmed and published online. link: https://www.youtube.com/watch?v=-vEmMWaM5cU, **471 views**.
24/10/2017	*Gravitational waves*, invited popular science talk at the KTH PhD Conference, Helsinki.
05/10/2014	Volunteer at the European Space Agency's open day at ESTEC. Gave short talks and answered questions form the public.

SKILLS

Programming (https://github.com/cescalara)

- Advanced: C/C++, python, Stan
- Competent: VHDL and high-level synthesis, ROOT, Geant4.
- Familiar: R, MATLAB, Fortran.

Software

- Engineering: Xilinx Vivado Design Suite, AutoCAD, Accuro TCAD.
- Tensorflow, LaTeX.

Languages

- Mother tongue: English.
- Fluent: Swedish, French.
- Basic knowledge: German, Dutch.