Filip Nechanský

Profile Summary

I have been a fellow at FZU since 2024 and member of the ATLAS experiment since 2014, where I currently focus on electron performance measurements and with large involvement in analyses of fundamental properties of the Standard Model. I bring practical and teaching experience in data analysis and statistics, and am proficient in Python and C++ and ATLAS software.

Education

04/09/2017 – 07/04/2021 **Doctor's degree, Humboldt University, Berlin**

- Awarded 07/04/2021**,** Magna cum laude

01/10/2015 – 13/06/2017 **Master's degree, Czech Technical University, Prague**

- Faculty of Nuclear Sciences and Physical Engineering
- Field of Experimental Nuclear and Particle Physics.
- Graduated with honors

01/10/2012 – 14/09/2015 **Bachelor's degree, Czech Technical University, Prague**

- Faculty of Nuclear Sciences and Physical Engineering
- Field of Experimental Nuclear and Particle Physics.
- Graduated with honors

2004 – 2012 **Maturita, Gymnazium Jaroslava Heyrovského, Prague**

Employment

01/05/2024 – **Fellowship as part of Physics for future programme (MSCA COFUND)**

- FZU - Institute of Physics of the Czech Academy of Sciences
- Experimental particle physics, ATLAS group

01/05/2021 – 30/04/2024 **DESY Fellowship in experimental physics**

- Deutsches Elektronen-Synchrotron DESY, Hamburg.
- Particle physics, ATLAS group

04/09/2017 – 30/04/2021 **Graduate scientific assistant**

- Deutsches Elektronen-Synchrotron DESY, Zeuthen.
- Particle physics, ATLAS group

Research experience

Key achievements: Significant contributor to observation of photon-induced WW production. Software convener for electron/photon performance group. Fit contact in ttH(bb) analysis responsible for signal extraction and validation. Exceptional ATLAS authorship for contribution to analysis during bachelor studies.

2014–pres. Member, ATLAS experiment:

Co-author on 429 ATLAS publications, significant contributions listed bellow

Electron/photon performance group (2021–present)

- Software convener since 2022, responsible for group software and propagation of electron performance results to the ATLAS experiment
- Involved in electron selection efficiency measurements
- Analysis software developer and maintainer for electron identification subgroup
- Contact with the Standard Model analysis group
- Technical advisor for PhD students working on electron performance

Member of ATLAS review board for legacy ttH(bb) measurements (2023-2024)

Measurement of the angular coefficients of the Z boson at 13 TeV (2021–present)

- Modeling uncertainties of background processes
- Measurement of forward electron performance
- Analysis contact
- Co-supervisor of PhD students

Analysis of charged particle spectra at 13.6TeV (2022–present).

- Developer of the analysis framework and technical advisor

Observation of photon-induced W +W − production at √s=13 TeV (2016–pres.).

- Developer of the analysis framework
- Feasibility studies in 2016-2017 as part of master's thesis under supervision of Oldřich Kepka
- Studies and corrections of pile-up and underlying event modeling
- Resulting publication:
  Physics Letters B 816 (2021) [DOI:10.1016/j.physletb.2021.136190]

Study of ttH production with H decaying into pair of b-quarks (2017–2020)

- Topic of the doctoral thesis under supervision of Klaus Moenig and Thorsten Kuhl
- Data/Monte Carlo and MC/MC studies, fitting, studies of ttbar modeling
- Fit contact for the single lepton channel (spring 2019–summer 2020)
- Resulting publication:
  J. High Energ. Phys. 2022, 97 (2022) [DOI:10.1007/JHEP06(2022)097]

Evaluation and development of a Warwick style cold setup for thermal testing of the ITk End-Cap modules (2017-2018)

- Hardware task on ATLAS upgrade
- Qualification task for ATLAS authorship

Study of photon-induced dilepton production at √s=13 TeV (2015–2017)

- Part of the master's thesis under supervision of Oldřich Kepka
- Contribution to the analysis framework and muon trigger efficiency derivation
- Resulting publication:
  Physics Letters B 777 (2018): 303 [arXiv:1708.04053]

Analysis of charged particle spectra at 13TeV (2014–2015)

- Part of the bachelor's thesis under supervision of Oldřich Kepka
- Focus on correction of the data to particle level.
- Resulting publication I gained exceptional authorship for:
  Physics Letters B 758 (2016) 67 [arXiv:1602.01633]

Summer 2018 **European School of High Energy Physics**

Summer 2016 **Summer Students at Fermi National Accelerator Laboratory**

- Summer Internship in Fermi National Laboratory

- Work focused on data analysis of LHC data.

Teaching experience, supervision

Informal involvement in supervision of two PhD students at DESY (2022-2024) as well as technical and physics advisor to students involved in electron performance measurements (2022-).

Summer 2022 **Supervision of a summer student**

- Electron resolution at low-mu environment.

Summer 2019 **Supervision of a summer student**

- ATLAS measurement of track impact parameter resolution.

2018-2019 **Tutorials for statistics and data analysis**

- Humboldt University of Berlin, two semesters.

Outreach

06/2024 **Science fair 2024 in Prague**, exhibitor

- Fair organized by the Czech Academy of sciences visited by over 30000 people

Fall 2017 and 2018 **International cosmic day**, presenter

- Project to present cosmic physics to high school students across the world

Fall 2016 **Masterclasses** at the Czech Technical University.

- Project to present particle physics to high school students across the world

Summer 2013, 2014 **TCN Summer camp,** organizer

- Summer camp for high school students with focus on Physics, Mathematics and informatics organized by students of the Faculty of Nuclear Sciences and Physical Engineering at the Czech Technical University

Highlighted talks

Regularly presenting in ATLAS internal meetings, including an ATLAS Week talk on electron and photon performance in front of the whole collaboration.

2024 **Measurements of Higgs boson production with top quarks with the ATLAS detector**

- ICHEP 2024, talk in Higgs parallel session
- Link: https://indico.cern.ch/event/1291157/contributions/5876701/

2023 **Final Performances for electron and photon calibration reconstruction and identification in Run 2**

- EPS-HEP2023, Hamburg, poster.
- Link: http://cds.cern.ch/record/2867103

2021 **Multi-boson production including vector-boson scattering and photon-photon fusion at ATLAS**

- WIN2021, virtual.
- Link: https://cds.cern.ch/record/2770554

2020 **Highlights 1: Measurement of photon induced WW production in pp collisions**

- ATLAS-D Meeting 2020, Berlin.

Languages

- Czech: Mother tongue
- English: Fluent
- German: Intermediate

Computer skills

Contributing to the ATLAS core software athena: https://gitlab.cern.ch/atlas/athena

Large fraction of my software projects is related to ongoing analysis and as such is internal to ATLAS, public repositories can be found at:

- https://github.com/fnechans
- https://gitlab.cern.ch/fnechans

Programming:

- Advanced experience with C++ and Python
- Intermediate experience with bash and C

Data Analysis:

- ROOT, ATLAS software
- Data analysis oriented python packages (numpy, pandas, …)

Graphics:

- Blender 3D, Gimp, Inkscape

Others:

- OS: Linux (Ubuntu, CentOS, Alma), Windows
- Text: LaTeX, OpenOffice, MarkDown
- Versioning: GitLab and GitHub, including continuous integration