

## RNDr. Jiri Kroll, Ph.D.

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### PROFESSIONAL INTERESTS / RESEARCH EXPERTISE

I currently work as a research scientist in a Department of Detector Development and Data Processing at the Institute of Physics of the Czech Academy of Sciences. The topic of my research is development and testing of semiconductor detectors of ultra-relativistic particles. The main project I am currently working on is the ATLAS Inner Tracker (ITk), whose goal is a complete replacement of the current Inner Detector of the ATLAS experiment installed on the LHC accelerator at CERN by the new full-silicon Inner Tracker. Within this project I have participated in a development of the new radiation hard silicon strip sensors. In the production phase of the project, I am heavily involved in quality control and quality assurance testing of 4500 silicon strip sensors of the end-cap type. Besides of my expertise in development and testing of semiconductor sensors, I was also the main coordinator of the ATLAS ITk strip testbeam and irradiation group between 2016 and 2023, which responsibility is to test various ITk strip components by the beams of high-energy particles produced at the testbeam and irradiation facilities installed at CERN, DESY, FNAL and other laboratories. My testbeam and irradiation activities of course continue even after I have officially finished my coordinator role.

I received my Ph.D. in nuclear physics at Charles University in 2013. Between 2013 and 2014 I was a postdoctoral researcher in a Department of Physics of the North Carolina State University, while locally I was working in Los Alamos National Laboratory, where I studied neutron induced nuclear reactions within the DANCE collaboration. Between the years 2015 and 2018 I was a postdoctoral researcher at the Institute of Physics of the Czech Academy of Sciences, working on the development and testing of silicon strip sensors and modules mainly within the ATLAS ITk project. I have been a research scientist at the same institute since 2019. In the year 2020 I received the Otto Wichterle Award for promising young scientists of the Czech Academy of Sciences in the category of Mathematics, Physics and Earth Sciences.

Besides of the ATLAS ITk project, which is currently in its production phase, I am intensively participating in various research activities focused on development and testing of new radiation hard semiconductor detectors of ultra-relativistic particles produced dominantly on the future particle accelerators, such as the Future Circular Collider at CERN. These activities are coordinated by the DRD3 group (former RD50 research group) centralized at CERN and are typically done in cooperation with private companies producing semiconductor components based on Si, SiC, or GaN materials.

### EDUCATION

2009 – 2013 Faculty of Mathematics and Physics, Charles University  
Educational attainment: Ph.D. in nuclear physics  
Thesis: Photon strength functions in Gd isotopes studied from resonance neutron capture  
Advisor: Milan Krticka

## Curriculum Vitae

- 2011 Faculty of Mathematics and Physics, Charles University  
Educational attainment: RNDr. (Doctor of Natural Sciences in nuclear physics)  
Thesis: Photon strength functions in  $^{160}\text{Tb}$  from two-step gamma cascade measurement  
Advisor: Milan Krlicka
- 2007 – 2009 Faculty of Mathematics and Physics, Charles University  
Educational attainment: Mgr. (Master's degree in nuclear and subnuclear physics)  
Thesis: Photon strength functions in  $^{160}\text{Tb}$  from two-step gamma cascade measurement  
Advisor: Milan Krlicka
- 2004 – 2009 Faculty of Mathematics and Physics, Charles University  
Educational attainment: Bc. (Bachelor's degree in General Physics)  
Thesis: Study of photon strength functions from two-step cascade measurements  
Advisor: Milan Krlicka

## CURRENT POSITIONS

- 2019 – present Research scientist, Department of Detector Development and Data Processing, Division of Elementary Particle Physics, Institute of Physics of the Czech Academy of Sciences, Czech Republic

## PREVIOUS POSITIONS

- 2015-2019 Postdoctoral Researcher, Department of Detector Development and Data Processing, Division of Elementary Particle Physics, Institute of Physics of the Czech Academy of Sciences, Czech Republic
- 2013-2014 Postdoctoral Research Scholar, Department of Physics, College of Sciences, North Carolina State University, USA (locally working at Los Alamos National Laboratory, NM, USA)

## PUBLICATIONS

***h*-index of 81 according to INSPIRE HEP, as of 7 Dec 2024**

I (co)authored a total of 634 journal articles and conference proceedings, most of them are papers by ATLAS collaborations. Of them around 20 are with less than 10 authors. My work has so far gained 25,451 citations (w/o self-citations).

Selected 5 most important articles published between 2019 and 2024:

1. M. Mikestikova et al., "The study of gamma-radiation induced displacement damage in  $n^+$ -in- $p$  silicon diodes", Nucl. Instrum. Methods Phys. Res. A **1064**, 169432 (2024).  
DOI: 10.1016/j.nima.2024.169432
2. Y. Unno et al., "Specifications and pre-production of  $n^+$ -in- $p$  large-format strip sensors fabricated in 6-inch silicon wafers, ATLAS18, for the Inner Tracker of the ATLAS Detector for High-Luminosity Large Hadron Collider", J. Instrum. **18**, T03008 (2023).  
DOI: 10.1088/1748-0221/18/03/T03008
3. J.-H. Arling et al., "Test beam measurement of ATLAS ITk Short Strip module at warm and cold operational temperature", J. Instrum. **18**, P03015 (2023).  
DOI: 10.1088/1748-0221/18/03/P03015

4. J. Kroll et al., “Effect of irradiation and annealing performed with bias voltage applied across the coupling capacitors on the interstrip resistance of ATLAS ITk silicon strip sensors”, Nucl. Instrum. Methods Phys. Res. A **1047**, 167726 (2023).  
DOI: 10.1016/j.nima.2022.167726
5. L. Poley et al., “The ABC130 barrel module prototyping programme for the ATLAS strip tracker”, J. Instrum **15**, P09004 (2020).  
DOI: 10.1088/1748-0221/15/09/P09004

## APPLICATION RESULTS AND SOFTWARE DEVELOPMENT

1. Wire bonding (wedge-wedge, 25 um aluminum wire) of experimental samples for ELI Beamlines and various research groups at the Institute of Physics of the Czech Academy of Sciences
2. Design and construction of various tools necessary for testing of samples by high-energy beams – cooling systems, moving stages, etc.

## RESEARCH GRANTS

Between the years 2019 and 2024, I have been involved as a standard investigator in 5 major research grants focused on R&D activities closely related to international cooperation of Czech research institutions with experiments and projects based at CERN. These grants together acquired more than 1.3 billion CZK.

500M CZK	Jan 2024 - Jun 2028	OPJAK FORTE (CZ.02.01.01/00/22_008/0004632)	MEYS, Johannes Amos Comenius Programme	Czech
206.4M CZK	Jan 2023 - Dec 2026	Research infrastructure for experiments at CERN (CERN-CZ), LM202340	MEYS, Large Research Infrastructure Program	Czech
37.9M CZK	Mar 2017 - Dec 2022	Getting new knowledge of the microworld using the CERN infrastructure, LTT17018	MEYS, program Inter-Excellence	Czech
267.9M CZK	Jan 2020 - Dec 2022	Research infrastructure for experiments at CERN (CERN-CZ), LM2018104	MEYS, Large Research Infrastructure Program	Czech
292.5M CZK	Jan 2016 - Dec 2019	Research infrastructure for experiments at CERN (CERN-CZ), LM2015058	MEYS, Large Research Infrastructure Program	Czech

## INVITED TALKS AT INTERNATIONAL CONFERENCES

I have given 2 invited talks between 2018 and 2023, of which 1 has been at an international conference. List since January 2018 is provided below:

- |          |   |
|----------|---|
| Oct 2022 | <i>ATLAS ITk strip detector</i> , Day with particle and astroparticle research infrastructures, Prague, Czechia   |
| May 2022 | <i>Effect of irradiation and annealing performed with bias voltage applied across the coupling capacitors on the interstrip resistance of ATLAS ITk strip silicon sensors</i> , 15th Pisa Meeting on Advanced Detectors - PM2021, Isola d'Elba, Italy |

## AWARDS and FELLOWSHIPS

2020 The Otto Wichterle Award to promising young scientists of the Czech Academy of Sciences - category of Mathematics, Physics and Earth Sciences

## PUBLIC OUTREACH

I am trying to be active in popularization and public outreach. I am organizing and providing frequent excursions into our Laboratory for testing of semiconductor particle detectors, including public visits during official Open Days or special events/schools for high school students organized by the Institute of Physics of the Czech Academy of Sciences. I had lectures during the Science to Go event in Prague, Fantasy Festival in Chotěbor, as well as at Gymnázium Decín.

## SUPERVISION OF GRADUATE STUDENTS and POSTDOCTORAL FELLOWS

MSc Co-supervisor of Iveta Zatočilová (Charles University)  
Co-supervisor of Vera Latonová (Charles University)  
Co-supervisor of Radek Privara (Palacký University)  
PhD Co-supervisor of Radek Privara (Palacký University)  
PostDoc Supervisor of Peter Svihra (Institute of Physics of the Czech Academy of Sciences)

## TEACHING ACTIVITIES

I was teaching students in laboratory courses (Nuclear and Subnuclear physics) at the Faculty of Mathematics and Physics of the Charles University between the years 2008 and 2013.

## MAJOR COLLABORATIONS

2015 – present Experiment ATLAS at CERN  
2009 - 2014 Experiment DANCE at Los Alamos National Laboratory  
2010 – 2014 Experiment n\_TOF at CERN

## ORGANIZATION OF INTERNATIONAL SCIENTIFIC MEETINGS

2020 Local convener of the Track “Operation, Performance and Upgrade of Present Detectors” of the 40th International Conference on High Energy Physics (ICHEP 2020), Prague, Czech Republic  
2018 Main organizer of the 3rd Face-to-Face meeting of the ATLAS ITk Strip testbeam and irradiation group, Prague, Czech Republic (approx. 15 participants)  
2011 Member of the Local Organizing Committee of the “Third International Workshop on Compound Nuclear Reactions and Related Topics”, Prague, Czech Republic (approx. 100 participants)

## INSTITUTIONAL RESPONSIBILITIES

2018 – present Deputy head of Laboratory for testing of semiconductor particle detectors

## COMMISSIONS OF TRUST AND SERVING SCIENTIFIC COMMUNITY

ATLAS Experiment 2016 – 2023: Activity Coordinator of the ATLAS ITk strip testbeam and irradiation group (WBS 2.2.11 - Irradiation and testbeam)  
ECFA-LDG 2023-present: Representative of Czech Republic in ECFA European Large National Laboratory Directors Group (ECFA-LDG)