Curriculum Vitae et Studiorum: Sottocornola Simone

Name:	Sottocornola Simone
Current position :	PostDoctoral Fellow at INFN sezione di Pavia
Address :	Via dei Beccaria 30, Cura Carpignano (PV), Italy
Email :	simone.sottocornola01@universitadipavia.it
	simone.sottocornola@cern.ch

Personal information

Date of birth:	6^{th} May 1990
Place of birth:	Chiavenna (SO), Italy

Working Experience

- **PostDoctoral Fellow in High Energy Physics** — INFN, sezione di Pavia, Pavia (IT)
  January 2020 – Present
- **CERN Associate position (INFN Similfellow)** — CERN, Geneva (CH)
  Supervisor: *Richard Hawkings* — *January 2018 – January 2019*
- **University of Pavia research grant** — CERN, Geneva (CH)
  Project title: *Validation of a hardware tracker for LHC* — *April 2017 – September 2017*

Education

- **PhD in High Energy Physics** — University of Pavia, Pavia (IT)
  Supervisor: *Andrea Negri* — *October 2016 – 21 January 2020*
  Thesis title: *A hardware based tracker for the ATLAS experiment: commissioning and trigger studies*
- **Master degree in Physics cum laude** — University of Pavia, Pavia (IT)
  Supervisor: *Gabriella Gaudio* — 28^{th} *October 2016*
  Thesis title: *QA/QC of the MicroMegas Pavia Readout Panels for the Muon Spectrometer Upgrade of the ATLAS Experiment*
- **Bachelor's degree in Physics** — University of Pavia, Pavia (IT)
  Supervisor: *Andrea Negri* — 24^{th} *July 2014*
  Thesis title: *FTK: un tracciatore hardware per il sistema di trigger di ATLAS*
- **Scientific high school diploma** — Liceo scientifico Leonardo da Vinci, Chiavenna (IT)
  July 2009

Teaching & outreach activities

- **Lectures for the course "Elementi di Fisica"** — Pavia (IT)
  University of Pavia, degree in Natural Science — *2020 – Now*
- **Lectures for the course "Metodi informatici della fisica"** — Pavia (IT)
  University of Pavia, degree in Physics — *2016 – 2018*
- **Co-supervisor for the thesis "Machie Learning Techniques in High Energy Physics"** — Pavia (IT)
  University of Pavia, thesis candidate: Marco Acerbis — *2018*
- **Summer student Mentor** — CERN (CH)
  CSU NUPAC program — *Summer 2018*
- **Outreach talk "Andar per CERN"** — Chiavenna (IT)
  Liceo scientifico Leonardo da Vinci — 10^{th} *May 2019*
- **Outreach talk "Il CERN di tutti noi"** — Sondrio (IT)
  Rotari Club Sondrio — 18^{th} *February 2020*
- **Participation to the European Researcher Night** — Pavia (IT)
  2016-2018

International schools attended

- **ISOTDAQ** — Amsterdam (ND)
  International School of Trigger and Data Acquisition — *February 2017*
- **International spring school Bruno Touschek** — Frascati (IT)
  Nuclear, Subnuclear and Astroparticle Physics school — *May 2018*

Conferences

International conferences:

- **IEEE Real Time 2020** — Virtual
  Poster: "Cooling and Timing Tests of the ATLAS Fast Tracker VME boards" — *October 2020*
- **CHEP (Computing in High Energy Physics)** — Sofia (BG)
  Talk: "Software based control and monitoring of a hardware based track reconstruction system for the atlas experiment" — *July 2018*

International workshops:

- **Young Researcher Workshop** — Frascati (IT)
  Talk: "FTK: An Hardware based Tracker for the ATLAS Experiment" — *May 2018*

International collaboration workshops:

- **ATLAS Trigger Workshop** — Virtual
  Talk: "DAQ toward Run-3" — *November 2020*

- **ATLAS TDAQ Week** — CERN (CH)
  Talk: "Feedback from HLT integration to TDAQ data-flow" — *March 2020*
- **ATLAS Week** — CERN (CH)
  Convener of the Upgrade session of the ATLAS week — *February 2020*
- **ATLAS TDAQ Week** — CERN (CH)
  Talk: "FTK online software status and plans" — *March 2019*
- **FTK kickoff workshop for LS2** — Geneva (CH)
  Talk: "FTK online SW status and future plans" — *January 2019*
- **ATLAS TDAQ Week** — Krakow (PL)
  Talk: "FTK status report" — *September 2018*
- **ATLAS TDAQ Week** — CERN (CH)
  Talk: "FTK online SW status" — *May 2018*
- **FTK YETS end operation workshop** — CERN (CH)
  3 talks about the status and future developments of the FTK online SW — *March 2018*
- **FTK kickoff workshop** — CERN (CH)
  3 talks about the FTK online SW status and plans — *January 2018*

National conferences:

- **National Congress of the Italian Physics Society** — Padova (IT)
  Talk: "Construction and QA/QC of the MicroMegas Readout panels for the Muon Spectrometer upgrade of the ATLAS experiment" — *September 2016*

National collaboration workshops:

- **Workshop ATLAS Italia** — Pavia (IT)
  Talk: "Status and perspective for FTK in 2018" — *October 2017*

Moreover, I chaired for 3 years the weekly FTK Online SW meetings, and I presented many report at the collaboration meetings, such as FTK meetings, HTT meetings (among which I chair the HTT online software meeting), NSW Data Quality meetings, DAQ and Trigger meetings.

Publications

- **Selected publications:**
  - Sottocornola S., et al. "Cooling and Timing Tests of the ATLAS Fast Tracker VME boards", arXiv:2010.14456, 2020. Status: submitted.
  - ATLAS collaboration. "The ATLAS Fast Tracker (FTK) System", https://cds.cern.ch/record/2732037, 2020. Status: in circulation.
  - Alexopoulos T., Sottocornola S., et al. "Construction techniques and performances of a full-size prototype Micromegas chamber for the ATLAS muon spectrometer upgrade", arXiv:1808.09752, 2018. Status: published.

- **Atlas collaboration publications:**

  Qualified as ATLAS author since May 2017.
  At the moment, I'm co-author of **292** ATLAS papers.
  The full list of publications can be found here: https://inspirehep.net/authors/1471782

- **Proceedings**

  - Sottocornola S. "Software based control and monitoring of a hardware based track reconstruction system for the ATLAS experiment", EPJ Web of Conferences CHEP 2018.
  - Sottocornola S. "FTK: an hardware based tracker for the ATLAS experiment", Frascati Physics Series, Fifth Young Researchers Workshop, https://cds.cern.ch/record/2677371, 2018.
  - Iizawa T., Sottocornola S., et all. "Performance Studies of the Associative Memory System of the ATLAS Fast Tracker" - 2018 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC 2018), Sydney, Australia, 10 - 17 Nov 2018

Research activities

- **Post Doc activities** — Pavia (IT)
  January 2020 - Now

  I'm currently involved in three main subprojects of the ATLAS experiment: the Data Acquisition (DAQ) system, the Hardware Track Trigger (HTT) project, and the New Small Wheel (NSW) project. For the ATLAS DAQ I'm currently working on the integration of the new multi-thread HLT implementation inside the ATLAS data-flow. Moreover, I'm active in the operation activities, with participation to the ATLAS Milestone weeks and Technical Runs. For the HTT project, I'm working on the development of the online software infrastrutcure. Thanks to the experience I gained during my PhD on the FTK project, I'm exstensively contributing in the design of the project software core framework. Finally, for the NSW project, I'm involved in the development of the detector Data Quality infrastructure.

- **PhD work** — CERN (CH)
  November 2016 - January 2020

  During the 3 years PhD period, I worked on the commissioning of the FTK hardware processor for the trigger upgrade of the ATLAS experiment.
  FTK is a hardware tracker, at that time in its installation and commissioning phase. FTK has been designed to reconstruct in few μs the tracks of the particles produced in the ATLAS detector, feeding this information to the High Level Trigger for the online events selection. The FTK system exploits Associative Memories and Field Reprogrammable Gate Array (FPGA) for the pattern recognition and track fitting procedures, allowing for a huge parallelization of the tracking process. The chips and the electronic boards, custom made, are developed by a consortium of more than 10 institutes from many different countries. The final system is composed of 8000 memory chips, 2000 FPGAs and more than 450 electronic boards, housed in 8 racks.

Thanks to different grants, I spent almost the whole PhD period at CERN, working in loco on the commissioning of the system. In particular, I get directly involved in the installation of the VME infrastructure, in the installation and testing of the electronic boards, and in the study of the performances of the custom cooling system, required to dissipate the huge power consumed by the FTK electronic boards, resulted in the full characterization of the cooling infrastructure. Moreover, I get directly involved in the development of the FTK online software, responsible of the system configuration, the management and the monitoring of the data-flow, and the management of the data taking control software. During the whole PhD period, I have been the FTK online sw contact person at CERN, the librarian of the FTK online sw project, as well as one of the main contributors to its development and maintenance. I directly contributed in the development and optimization of all the different aspects of the sw project: from the development of the core sw (among which the multithreading implementation of the sw framework), the development of the configuration and monitoring tools, to the coordination of the board specific development tasks.

- **CERN Associate position** CERN (CH)
  January 2018 - January 2019

  Thanks to the INFN *similfellow* grant, which allowed me to spend the whole 2018 period at CERN, I get involved in the study of the performances of new trigger chains based on the tracks produced by the new Fast TracKer (FTK) system. In particular, I contributed to the study of the b-jet trigger selection performances. Moreover, I studied a new τ trigger chain that, exploiting the FTK peculiarities, would be able to increase the τ lepton trigger selection performances. In particular, I studied the improvements in trigger acceptance and statistical significance that the use of this new trigger chain would have, applied to the search for a charged Higgs boson in the $h^+ \to \tau\nu$ decay channel.

- **Master thesis work and ATLAS qualification** University of Pavia, (IT)
  QA/QC of the MicroMegas Pavia Readout Panels for the Muon Spectrometer Upgrade of the ATLAS Experiment *September 2015 - December 2016*

  During my Master thesis, I joined the Pavia ATLAS group in the development of the QA/QC procedures needed for the construction of the MicroMegas detectors for the NSW upgrade. In particular, I worked on the set up and on the certification of the QA/QC procedures, on the development of the tools required for the tests and on the coding of the software needed both for the data acquisition and for the analysis of the collected data. I developed specific tools and specific procedure of measurements for each detector component, in order to obtain the very high precision required for the production. Moreover, I worked at CERN on the validation of the preproduction PCBs, performing studies on the quality of the boards. I also participated in the test beam of the Italian Module-0, and again at CERN, I performed studies on the variation of performances of the Italian Module-0 with X-ray irradiation under deformation of the chamber.

Programming Skills

- Object-oriented, structured and functional programming: **C, C++**
- Scripting languages: **bash, python**
- Database: **Oracle, MySql**
- Simulation tool for HEP and medical field: **Geant4, FLUKA, MCNP**
- Data analysis packages: **ROOT**
- Multivariate Analysis tools: **TMVA, scikit-learn, TensorFlow**
- Word processing: **LateX**
- Electrical circuits simulation: **PSpice**
- Data acquisition and Signal processing: **LabView**
- Operating system: **Linux, OS X, Windows**

Languages

- Italian **Mother tongue**
- English **Good**
- French **Fair**

Other interests

I'm very interested in Computer science, Electronics and Information Technologies. I enjoy working on small Arduino or Raspberry projects, and I like mechanical works, as old cars restoration. I'm member of the CERN automobil club since 2018.

Pavia, 11/11/2020 Sottocornola Simone