**Caterina Doglioni** Dr., Date of birth: 27.07.1984 [198407273427], Pronouns: she/her

Physics Department, Division of Particle Physics, Lund University

e-mail: [caterina.doglioni@hep.lu.se](mailto:caterina.doglioni@hep.lu.se), telephone: +46 (0) 46-22 27695

**Brief research statement**

*Throughout my career, I have been driven by finding out more about the constituents of matter as well as by the challenges related to the “big science” needed to study them (complex instruments, vast amounts of data, an international community working together). I chose to pursue my research at the Large Hadron Collider (LHC), the largest discovery machine ever built by humankind that could produce dark matter (DM) particles in controlled conditions, contributing to the solution of a mystery of our universe. The narrative in this CV outlines the path I took to establish myself as a leading actor for LHC DM searches, with an ambition to pursue these searches using novel data selection techniques essential for discoveries in an environment with large amounts of data.*

**Education**

**2003-2008:** Undergraduate studies: Universita’ di Roma ’Sapienza’, Italy.

* Master’s Degree, final marks: 110/110 Cum Laude, GPA: 29.7/30.
* Bachelor’s Degree, final marks: 110/110 Cum Laude, GPA: 29.2/30.

**2008-2011:** D. Phil. Degree (16/12/2011), University of Oxford, Merton College, UK.   
*Thesis title:* Measurement of the inclusive jet cross section with the ATLAS detector at the LHC.   
*Supervisor:* Prof. Amanda Cooper-Sarkar.

*During my PhD at the University of Oxford (2008-2011) I have become an expert in the identification, reconstruction and performance of the most common physics signature produced at the LHC: jets**of particles originating from the constituents of the collided protons. My thesis provides the first-ever estimate of the uncertainty on jet energy measurements in the ATLAS experiment, described in one of the 10 most cited LHC papers.*

**Postdoctoral experience**

**2011-2015:** Senior research and teaching assistant (Maître-assistante), University of Geneva, CH   
*At the start of my post-doc at the University of Geneva I used my PhD knowledge to perform the first search for new particles decaying into two jets with early 2012 LHC data, probing the highest possible energy scales. In October 2012, I was appointed convener of the Jets and Dark Matter group, leading 70 members to the publication of papers on searches for new physics with jets. My own research focused on DM and highlighted an unexplored region out of the reach of traditional data taking technique. In 2014, I was appointed by the ATLAS and CMS management to co-lead the Dark Matter Forum, and subsequently the Dark Matter Working Group within the LHC Physics Center at CERN to disseminate recommendations on the search targets and interpretation of LHC DM searches. This experience was instrumental for the DARKJETS ERC StG research program to begin the exploration of low-mass DM mediators that continues with the REALDARK CoG research program.*

**Employment**

**2019-present:** Senior University Lecturer (Lektor), Lund University. Reader (docent) since 30/08/2017.

**2015-2019:** Associate Senior University Lecturer (Biträdande lektor), Lund University. *As an assistant professor at Lund University since April 2015, I work with a post-doctoral researcher and two PhD students supported by the ERC DARKJETS Starting grant[[1]](#footnote-1). We deployed a real-time analysis technique called “Trigger-Level Analysis” (TLA) for the first time in the ATLAS experiment and applied it to dark matter searches, leading to the strongest constraints to date on DM mediator models, and disseminated our results through peer-reviewed papers that I edited, contributions at international conferences, press releases and outreach events. TLA has also been added to the current issue of The Swedish Guide for Big Science and I continue being involved in synergistic activities (see below) as real-time analysis goes beyond the ATLAS experiment.*

**Prizes, fellowships and awards**

**2018:** Sten Von Friesens Pris, Royal Physiographic Society in Lund, *for the advancement of measurement methods in particle physics and for the ambition of strongly linking particle physics and other disciplines*

**2018-2011:** [Full PhD funding](https://www.theguardian.com/education/2009/apr/14/eu-research-students-univerity-grants) fromscholarships by various foundations from Italy, UK, US.

**2011:** Thesis nominated as an outstanding contribution by the University of Oxford, and published in the [Springer Theses series](http://www.springer.com/gp/book/9783642305375)).

**2009:** Perkins prize for Best performance for 1st year PhD student in Oxford particle physics.

**2003-2008:** Full scholarship at the [Collegio Universitario Lamaro Pozzani](https://www.collegiocavalieri.it/)**,** funded by the IT National Federation of Holders of the Order of Merit for Labour, hosting < 15 selected Italian students/year.Winner of INFN scholarship for physics graduates in particle physics (ranked 1st in Italy).

**Supervision**

**Main supervisor** of **two postdocs** (William Kalderon 2016-09/2019, Jannik Geisen 09/2019-now) **2 PhD** (Eric Corrigan 2016-now, Eva Hansen 2016-now), **a Licentiate, 7 Master’s, 8 Bachelor’s students** (Lund University, supervised theses can be found [on my website](http://www.hep.lu.se/staff/doglioni/darkjets.html#undergrads)), **co-supervisor of 5 PhD students** (Lund University/UniGe).   
Supervisor of 13 CERN summer students (Lund University/UniGe).  
Mentoring of work experience for female high school students at CERN.

**Selected professional memberships and steering groups:**

**2020-:** Chair of the Swedish Particle Physics and Astrophysics Board.

**2019-:** Member of the [COMPUTE research school](http://cbbp.thep.lu.se/compute/Courses.php) steering group in the LU Science Faculty.

**2019-:** Experimental responsible in “think tank” on dark matter at colliders towards the European Strategy of Particle Physics. [needs to be rephrased]

**2017-:** Elected member of the Swedish Particle Physics and Astrophysics Board.

**Grant review assignments:**

Remote expert reviewer for ERC Grants.

Panel member for the annual merit-review and comparative-based research program for the U.S. Department of Energy, Washington, D.C. (USA).

Evaluator for the Merit Reviews of the Israel Science Foundation (ISF)

**Journal review assignments**

|  |  |
| --- | --- |
| Since 2016 | Reviewer for the European Journal of High Energy Physics (JHEP) |
| Since 2018 | Reviewer for the European Journal of Physics C (EPJC) |

**Teaching and course development**

2015-: *Lund University.* Course responsible for [Particle Physics, Cosmology and Accelerators](https://www.lunduniversity.lu.se/lubas/i-uoh-lu-FYSC14), Bachelor’s degree at the Natural Sciences faculty. Co-teacher of various courses, including graduate-level course on [Jupyter notebooks](https://github.com/mlund/jupyter-course) and Master’s level course using [ATLAS Open Data](http://opendata.atlas.cern/).

**Experience of communicating research finding with stakeholders/end users:**

2018: [LU press release](https://www.lu.se/article/fysiker-forfinar-sokandet-efter-mork-materia) on research on real-time analysis DM searches, interviews to radio and science magazines (Italy/Sweden).

2016-:Lund University responsible for the IPPOG Masterclasses in Particle Physics. In 2018 I started hosting the [Masterclasses for the UN International Day of Women and Girls in Science](http://www.hep.lu.se/masterclass/), (open to all genders). [LU Press release](https://www.lu.se/article/ungdomar-far-chans-att-jaga-higgspartiklar).

**International responsibilities and synergistic Activities:**

2019: Organizing committee of 2-week [Institute Pascal workshop](https://indico.cern.ch/event/793125/) on Real-time analysis, in Paris

2019: Proposer of 2-week workshop on Axion-Like particles and hidden photons, at [MITP](https://www.mitp.uni-mainz.de/call-for-proposals/).

2018-: Invited with other 15 young LU faculty to the [LMK Foundation](https://lmkstiftelsen.se/) Idea Forum. Led to the submission of a funded interdisciplinary [Pufendorf Institute](https://www.pi.lu.se/en/) Advanced Study Group on Real-time analysis with the faculties of Physics, Social Sciences, Law, Engineering, whose activities can be found [here](https://realtime.blogg.lu.se/).

2018-: Convenor of [High Energy Physics Software Foundation](https://hepsoftwarefoundation.org/) [Trigger and Reconstruction working group](https://hepsoftwarefoundation.org/workinggroups/recotrigger.html) (~150 physicists)

2014-2018: Founder and organizer of the [ATLAS/CMS Dark Matter Forum](https://twiki.cern.ch/twiki/bin/view/LHCDMF/WebHome) and [LHC Dark Matter Working Group](https://lpcc.web.cern.ch/content/lhc-dm-wg-wg-dark-matter-searches-lhc) at the LHC Physics Center at CERN (~300 physicists)

2017-: Coordinator of the [SMARTHEP](http://smarthep.hep.lu.se/) researcher/industry network on real-time analysis, re-submitted to ITN-MSCA-2020 call.

2017-: Lund co-PI of the [INSIGHTS](https://insights-itn.eu/) researcher/industry network, on statistics and machine learning for industry and society (granted within ITN-MSCA-2017 call).

2011-2014: Member of the ATLAS Collaboration Board Chair Advisory Group, Member of the Recognition Task Force.

HELIOS

DarkMACHINES

**Selected conference organization and invited talks:**

|  |  |
| --- | --- |
| 2019- | Invited talks on Dark Matter and Beyond the Standard Model searches at the LHC at various conferences (including Accelerating the search for DM with machine learning 2019, Italy; Puzzle of Dark Matter 2018, Germany; TeVPA 2018, Germany; Dark Matter @ LHC 2016, US; Particle Physics and Cosmology Symposium 2014, China) |
| 2018- | Overall programme committee chair of 23rd international conference on Computing for High Energy Physics (CHEP), Australia (500 participants) |
| 2018 | Main organizer of the Swedish particle physics community conference in Lund (80 pp) |
| 2016 | Scientific organizer committee of the Dark Matter workshop during KAW foundation’s 100th anniversary symposium “Big Questions in Astrophysics”(36 participants) |
| 2015 2017 | Chair of the “Dark Matter” and “Higgs and Beyond the Standard Model physics” sessions at the European Physical Society Conferences, Austria and Italy |
| 2014- | Chair of the Beyond the Standard Model and QCD session at the 3rd, 4th and 6 th Large Hadron Collider Physics Conference, US, Lund and Italy (350 participants). Member of the local organizing committee in Lund. |
| 2014- | Session chair and organizer of Dark Matter @ LHC Conferences in Netherlands, UK and Germany (~100 participants). |
| 2014 | Local organizer and responsible for logistics (350 participants) of Future Circular Colliders Kick-off meeting, Switzerland. |

Track record? This Consolidator grant is a **natural extension of my research program, significantly expanded in ambition and experimental coverage**. It extends real-time analysis as the stepping stone to new, more sensitive DM searches with broad theoretical motivations, uses machine learning techniques to make sure no stone is left unturned, and brings the Lund group and the Swedish community together to make a major contribution to the global DM landscape. This grant would establish me further as a leader in my field and responsible for a research program with implications beyond high energy physics.

1. For a popular summary of DARKJETS and its team (in Swedish), see <https://www.lu.se/article/fysiker-forfinar-sokandet-efter-mork-materia>. [↑](#footnote-ref-1)