

# Davide Giordano

PHD STUDENT

Università degli Studi di Torino, Dipartimento di Fisica

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## Research summary

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My research activity is focused on data analysis in particle physics.

I started during my bachelor studying transverse momentum dependent parton distribution functions in the single-polarised pion-induced Drell-Yan (DY) data collected by COMPASS in 2015, giving my contribution on the optimisation of the events selection criteria and in the DY events reconstruction in the J/Psi mass range. For COMPASS collaboration I did the cross-check of the analysis of unpolarized asymmetries in Drell-Yan pion-induced process from COMPASS 2018 data.

My master and Ph.D. project fit in the context of AMBER experiment. I spent time under the supervision of the AMBER group of the Technical University of Munich (TUM), working on the future triggerless readout based on FPGA-TDC. Currently I am working on the analysis of the anti-proton production cross-section in p-He collisions at AMBER, measurement related to indirect dark matter search. I have a leading role in the analysis of this data and I am responsible for the alignment of the spectrometer.

As a member of Torino group in COMPASS and AMBER collaborations, I actively participated in data taking by doing shifts, week coordinations and by serving as detector expert of RichWall (a 5 m x 4 m gaseous drift detector) and eleven Multi Wire Proportional Chambers (MWPCs) stations of AMBER and COMPASS spectrometers. I equipped and tested the complete readout with new FPGA-TDC electronics of one MWPC. During the years, with my group I performed several interventions on those detectors, including the complete hardware dismantling and further assembling of the RichWall for mechanical reparation and the replacement of cathodes on several MWPCs stations.

My current position is related to the development and test of a dRICH detector for the ePIC (electron-Proton/Ion Collider) future experiment at the Electron-Ion Collider (EIC) facility located at the Brookhaven National Laboratory (BNL).

## Positions

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### Assegno di Ricerca

Torino, IT

ISTITUTO NAZIONALE DI FISICA NUCLEARE

Jan 2024 - present

- Project: The dRICH detector for the EPIC experiment at the future Electron-Ion Collider: Front-End electronics and Monte Carlo simulation

## Education

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### Ph.D. Physics

Torino, IT

UNIVERSITÀ DEGLI STUDI DI TORINO

Oct 2020 - present

- Supervisor: Prof. Michela Chiosso

### Master degree Physics

Torino, IT

UNIVERSITÀ DEGLI STUDI DI TORINO

Sep 2018 - July 2020

- Title: Feasibility study for proton-induced antiproton production cross-section measurement at COMPASS+/AMBER
- Supervisor: Prof. Michela Chiosso
- Grade: 110L/110

### Bachelor degree Physics

Torino, IT

UNIVERSITÀ DEGLI STUDI DI TORINO

Sep 2015 - July 2018

- Title: Study of J/Psi production in COMPASS 2015 data
- Supervisor: Prof. Michela Chiosso
- Grade: 109/110

### Human Science diploma

Fossano, IT

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Sep 2010 - July 2015

- Grade: 83/100

## Participation in international and national collaborations

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2020 - now **AMBER collaboration**, member  
2018 - now **INFN - Istituto Nazionale di Fisica Nucleare**, associate  
2018 - now **COMPASS collaboration**, member

*CERN*  
*Torino, IT*  
*CERN*

## Presentations

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*\* presenting author*

Giordano D.\* , 02 November 2023, "POKER/NA64 and AMBER: a mini-workshop on DM related searches", talk  
Giordano D.\* , on behalf of AMBER collaboration, 3-9 September 2023, "Quark Matter 2023", poster  
Giordano D.\* , on behalf of AMBER collaboration, 6-13 July 2022, "ICHEP 2022", poster  
Giordano D.\* , on behalf of AMBER collaboration, 7 March - 04 April 2022, "Antinuclei in the Universe? @MIAPP", talk  
Giordano D.\* , 14-18 Sept 2020, "106th National Congress SIF", talk

## Teaching and high formation activities

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2021-2022 **Physics**, Teaching Assistant, Master degree Pharmacy, dept of Drug Science and Technology *U. Of Torino*  
2021 **Physics 2**, Tutor, Bachelor degree course in physics, Physics dept *U. of Torino*  
2020 **Introduction to programming**, Laboratory assistant, Bachelor degree course in physics, Physics dept *U. of Torino*  
2019 **Incoming and outgoing mobility**, Assistant, Bachelor degree course in physics, Physics dept *U. of Torino*  
2017 **Experimental physics 1**, Laboratory assistant, Bachelor degree course in physics, Physics dept *U. of Torino*

## Mentoring

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2023 **Stoian Ivanov**, Master degree physics *U. of Torino*  
2022-2023 **Luca Baudino**, Master degree physics *U. of Torino*  
2022 **Ginevra Meinardi**, Bachelor degree physics *U. of Torino*  
2022 **Emanuele Del Grande**, Bachelor degree physics *U. of Torino*

## Schools and internships

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### First European Summer School on the Physics of the Electron-Ion Collider

*Corigliano-Rossano, IT*

ORGANIZED BY: INFN, UNIVERSITY OF CALABRIA, UNIVERSITY OF CATANIA AND UNIVERSITY OF SALERNO AND THE DATA CENTER RECAS-BARI

*June 2023*

- The school featured lectures and tutorials on theoretical and experimental topics related to the physics of the EIC

### 5th HEP C++ Course and Hands-on Training - Advanced C++

*CERN*

ORGANIZED BY: SOFTWARE INSTITUTE FOR DATA-INTENSIVE SCIENCE (SIDIS), CERN, HEP SOFTWARE FOUNDATION (HSF)

*Oct 2022*

- The course featured advanced C++ topics geared toward HEP

### INFN School of Statistics

*Paestum, IT*

ORGANIZED BY: INFN

*May 2022*

- The school provided an overview of statistical methods and tools used in particle, astro-particle and nuclear physics.

### Thematic CERN School of Computing

*Split, HR*

ORGANIZED BY: CERN AND UNIVERSITY OF SPLIT

*October 2021*

- The school focus was on the theme of Scientific Software for Heterogeneous Architectures.

### Basics of Accelerator Physics and Technology - CAS

*Remote*

ORGANIZED BY: CERN

*May 2021*

- The course covers a complete overview of the theoretical description of beams in accelerators and all the main technologies needed to construct an accelerator

## Internship

ADVISOR: BENJAMIN MORITZ VEIT

- Project: Characterization of TDC readout for AMBER. Part of master thesis work.

CERN, FR

August 2019

## ERASMUS traineeship

ADVISOR: DR.CATARINA QUINTANS

- ERASMUS: Study of J/psi production in COMPASS 2015 data. Bachelor thesis work.

LIP, Lisbon, PT

April 2018 - June 2018

## Languages and technical skills

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<b>Languages</b>	Mother tongue in Italian, advanced in English
<b>Programming tools</b>	Unix systems, C++, Python, ROOT framework, Mathematica
<b>Editing</b>	LaTeX environment, Microsoft Word, Excel, Power Point

## Publications

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- [1] G. Alexeev et al. [COMPASS Collaboration], Probing transversity by measuring  $\Lambda$  polarisation in sidis, *Physics Letters B* **824** (2022) 136834. ISSN 0370-2693. [doi:<https://doi.org/10.1016/j.physletb.2021.136834>]. URL <https://www.sciencedirect.com/science/article/pii/S0370269321007747>.
- [2] G. Alexeev et al., Transverse-spin-dependent azimuthal asymmetries of pion and kaon pairs produced in muon-proton and muon-deuteron semi-inclusive deep inelastic scattering, *Physics Letters B* **845** (2023) 138155. ISSN 0370-2693. [doi:<https://doi.org/10.1016/j.physletb.2023.138155>]. URL <https://www.sciencedirect.com/science/article/pii/S0370269323004896>.
- [3] G. Alexeev et al. [COMPASS Collaboration], Double  $J/\Psi$  production in pion-nucleon scattering at compass, *Physics Letters B* **838** (2023) 137702. ISSN 0370-2693. [doi:<https://doi.org/10.1016/j.physletb.2023.137702>]. URL <https://www.sciencedirect.com/science/article/pii/S0370269323000369>.
- [4] G. Alexeev et al. [COMPASS Collaboration], Collins and sivers transverse-spin asymmetries in inclusive muoproduction of  $\rho^0$  mesons, *Physics Letters B* **843** (2023) 137950. ISSN 0370-2693. [doi:<https://doi.org/10.1016/j.physletb.2023.137950>]. URL <https://www.sciencedirect.com/science/article/pii/S0370269323002848>.
- [5] M. Alexeev et al., Development of a micromegas prototype for the amber experiment at cern, *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* **1049** (2023) 168043. ISSN 0168-9002. [doi:<https://doi.org/10.1016/j.nima.2023.168043>]. URL <https://www.sciencedirect.com/science/article/pii/S0168900223000335>.
- [6] G. D. Alexeev et al. [COMPASS Collaboration], High-statistics measurement of collins and sivers asymmetries for transversely polarised deuterons, arXiv:2401.00309 (2023).
- [7] G. D. Alexeev et al. [COMPASS Collaboration], Spin density matrix elements in exclusive  $\rho^0$  meson muoproduction, arXiv:2210.16932 (2023).
- [8] C. Alice et al., Development and test of the micromegas detector prototype and its readout electronics for the amber experiment at cern, *Journal of Instrumentation* **18** (2023) C07004. [doi:10.1088/1748-0221/18/07/C07004]. URL <https://dx.doi.org/10.1088/1748-0221/18/07/C07004>.
- [9] D. Giordano, Measurement of antiproton production cross sections for dark matter search at the AMBER Experiment at CERN, *PoS ICHEP2022* (2022) 1197. [doi:10.22323/1.414.1197].

- [10] G. D. Alexeev et al. [COMPASS Collaboration], Exotic meson  $\pi_1(1600)$  with  $J^{PC} = 1^{-+}$  and its decay into  $\rho(770)\pi$ , *Phys. Rev. D* **105** (2022) 012005. [doi:10.1103/PhysRevD.105.012005]. URL <https://link.aps.org/doi/10.1103/PhysRevD.105.012005>.

Autorizzazione al trattamento dei dati in conformità alla Dlg. 193/06