

# Davide Giordano

PHD STUDENT

Università degli Studi di Torino, Dipartimento di Fisica

0000-0003-0228-9226

## Research summary

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 antiproton 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

### Assegno di Ricerca

ISTITUTO NAZIONALE DI FISICA NUCLEARE

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

Torino, IT

Jan 2024 - present

## Education

### Ph.D. Physics

UNIVERSITÀ DEGLI STUDI DI TORINO

- Supervisor: Prof. Michela Chiosso

Torino, IT

Oct 2020 - present

### Master degree Physics

UNIVERSITÀ DEGLI STUDI DI TORINO

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

Torino, IT

Sep 2018 - July 2020

### Bachelor degree Physics

UNIVERSITÀ DEGLI STUDI DI TORINO

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

Torino, IT

Sep 2015 - July 2018

### Human Science diploma

LICEO STATALE G. ANCINA

- Grade: 83/100

Fossano, IT

Sep 2010 - July 2015

## Participation in international and national collaborations

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

CERN  
Torino, IT  
CERN

## Presentations

\* *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

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

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

### 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

June 2023

CENTER RECAS-BARI

- 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 muon production 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 muon production, 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