Andrea Signori - *curriculum vitae*

Work address	University of Turin - Physics Department via Pietro Giuria 1, IT-10125, Turin, Italy "new" building, 5^{th} floor, office E24
Email	andrea.signori@unito.it
Homepage	https://sites.google.com/view/unitohadron
Office Phone	+39 011 670 7252
CV last updated	October 6, 2023

Profile

I am an assistant professor (tenure-track researcher - RTDb) at the University of Turin (IT) and I work in the field of theoretical subatomic physics. My interests focus on quantum chromodynamics (QCD), the theory which describes the strong force and the emergence of hadrons from the elementary degrees of freedom, quarks and gluons. I conduct research in the theory and phenomenology of hadron structure and of the hadronization mechanism, together with their impact on high-energy physics. I can rely on a solid network of collaborations within international groups. I have experience and attitude for teaching and tutoring and I am involved in outreach activities.

Contents

Work experience

July 2022 - University of Turin
Assistant professor (tenure-track researcher - RTDb)

Theoretical and phenomenological investigations of Quantum Chromodynamics (QCD), in particular of hadronization, hadron structure, and their impact on high energy physics. Quantum Electrodynamics (QED).

Institution: Physics Department, University of Turin and local INFN (National institute for nuclear physics) branch

Sept. 2019 - June 2022 University of Pavia
Marie Curie Global Fellow

Theoretical and phenomenological investigations of hadronization and hadron structure, multi-dimensional imaging of hadrons, impact on high-energy physics.
Supervisors: prof. Alessandro Bacchetta, prof. Jianwei Qiu.

Location: Theory Center, Jefferson Lab (VA, USA - 2019-2021), and Physics Department, University of Pavia (IT, 2021-2022)

Aug. 2018 - Aug. 2019 Argonne National Laboratory
Postdoctoral researcher

Member of the Physics Division. Investigations of quantum chromodynamics with perturbative and non-perturbative methods, in support of the scientific program of a future Electron-Ion Collider (EIC).
Supervisor: dr. Ian Cloet.

Location: Physics Division, Argonne National Laboratory (IL, USA)

Nov. 2016 - Aug. 2018 Thomas Jefferson National Accelerator Facility - Jefferson Lab
Postdoctoral researcher

Member of the Theory Center, working on the scientific case of high-energy scattering experiments aimed at improving our understanding of hadron structure.
Main collaborators: prof. Alberto Accardi, prof. L. Gamberg (Penn State U.), prof. Jianwei Qiu (supervisor), prof. Ted Rogers.

Location: Theory Center, Jefferson Lab (VA, USA)

Nov. 2012 - Oct. 2016 FOM - Foundation for Fundamental Research on Matter
Junior scientist

Ph.D. candidate in the FOM team led by prof. dr. P.J.G. Mulders.

Topic: Theoretical subatomic physics.
Research program focused on theory and phenomenology of transverse-momentum-dependent partonic distributions and their impact on high-energy scattering experiments.

Locations:

- Department of Physics and Astronomy, Vrije Universiteit Amsterdam (NL)
- Theory Group, Nikhef - National Institute for Subatomic Physics (NL)

Graduation date: Oct. 17^{th} 2016.

Dissertation: Flavor and evolution effects in TMD phenomenology (ISBN: 978-94-6233-401-4).

Jul. 2012 - Sep. 2012 DESY - Deutsches Elektronen-Synchrotron (DE)
Summer Intern

Phenomenological investigation of quantum chromodynamics at the HERMES experiment, supervised by dr. Gunar Schnell and dr. Aram Movsisyan.

Topic: Transverse double spin asymmetry in inclusive hadron production at HERMES.

Report: see my list of publications or the DESY online archive.

Awards and grants

Dec. 2022 University of Turin
Grant for Internationalization (GFI)

The GFI aims at supporting projects that foster the international dimension of the University of Turin, reinforcing the exisisting partnerships and nurturing new ones.
Title: ***Improving TMD factorization for the next generation of hadron physics experiments (TMDpro)***
Grant amount: 11 k€

June 2019 Jefferson Science Associates, LLC
JSA postdoctoral prize

The JSA postdoctoral prize for distinguished postdocs is run by the Jefferson Lab Users Organization Board of Directors. The award is based, in part, on a record of accomplishment in physics, the originality and quality of the proposed research, its impact on the Jefferson Lab physics program, and the proposed use of the research grant.
Title: ***Unraveling hadronization***
Grant amount: $ 10k (announcement here)

Feb. 2018 European Commission - Horizon 2020 program
Marie Skłodowska-Curie Global Fellowship

The Marie Skłodowska-Curie Actions (MSCA) are a set of major mobility research grants created by the European Commission to support excellent scientific research. The MSCA fellowships are among Europe's most competitive and prestigious awards. The fellowship program aims to foster the career development and further training of researchers at all career stages, promoting interdisciplinary research and international collaborations.
Title: ***SQuHadron - Strategies to tackle the quest for hadronization***
Beneficiary: University of Pavia (IT), 2021-2022. Partner institution: Jefferson Lab (VA, USA), 2019-2021.
Grant amount: 262 k€ (announcement here, fact-sheet here)

Sept. 2015 ILCAC - International Light Cone Advisory Committee
Gary McCartor travel award

Prize assigned by ILCAC to allow young scientists to develop their expertise and contribute to forefront physics research. Travel awards are granted to present research topics at the annual light cone conferences.

Education

2012-2016 **Ph.D. Theoretical Subatomic Physic**
Department of Physics and Astronomy,
Vrije Universiteit Amsterdam, the Netherlands

Topics:
Theory and phenomenology of tranverse-momentum-dependent partonic distributions and their impact in high-energy physics processes.

Promotor and supervisor: Prof. dr. P.J.G. Mulders (VU and Nikhef)
Copromotor: Dr. Marco Radici (INFN Pavia)
Final dissertation: Flavor and evolution effects in TMD phenomenology
(ISBN: 978-94-6233-401-4).
Graduation date: Oct. 17^{th} 2016.

*Declared equivalent ("**equipollente**") to the Italian title of "dottore di ricerca" by the Italian Ministry for Education (MIUR) in 2018.*

2009-2012 **M.Sc. Physical Sciences - Theoretical curriculum**
Faculty of Mathematical, Physical and Natural Sciences
University of Pavia, Pavia (Italy)

Including additional classes on *scientific journalism* (2011)

Final dissertation:
Exploring the flavour dependence of unpolarized transverse-momentum-dependent distributions
Promotors: Prof. dr. A. Bacchetta, Dr. M. Radici (INFN and University of Pavia)

2006-2009 **B.Sc. Physics**
Faculty of Mathematical, Physical and Natural Sciences
University of Pavia, Pavia (Italy)

Final dissertation: Yang-Lee's theory of phase transitions (statistical mechanics)
Promotor: Prof. dr. G. Zambotti (University of Pavia)

2001-2006 **Scientific high-school diploma** (Diploma di maturità scientifica)
Liceo Scientifico G. Aselli, Cremona (Italy)

Research stays and visits

- **Institut de Physique Nucléaire, Orsay (FR)**
  Collaboration with Dr. J. P. Lansberg
  Mar. 15-18, 2015 / Nov. 2-4, 2014

- **Penn State University - Berks, Reading, PA (USA)**
  Collaboration with prof. L. Gamberg, prof. A. Prokudin, dr. D. Pitonyak
  Nov. 2-9, 2017

- **Thomas Jefferson National Accelerator Facility - Newport News, VA (USA)**
  Collaboration with the Theory Center
  Regular visits in 2018-2019

- **University of Michigan - Ann Arbor, MI (USA)**
  Collaboration with prof. C. Aidala and her research group
  Apr. 9-11, 2019

- **University of Pavia and INFN, Pavia (IT)**
  Collaboration with the local "Hadron structure and QCD" group
  Dec. 13-21, 2018 / Apr. 24-28, 2017 / Jul. 20-24, 2015 / Dec. 17-20, 2013

Teaching experience and qualifications

University of Turin - IT

The following is a list of the courses that I am teaching at the University of Turin as an assistant professor (RTDb). An overview is also available from the Physics Department webpage.

- *"Computational neuroscience"* for the M.Sc. degree in Biotechnology for Neuroscience (a.y. '23/'24)
  In collaboration with prof. M. Caselle (dep. of Physics), T. Brischetto Costa (dep. of Psychology)
- *"Mathematics and physics"* for the B.Sc. degree in Biology (a.y. '22/'23, '23/'24)
  In collaboration with prof. C. Angelantonj (dep. of Physics)
- *"Quantum Mechanics"* for the B.Sc. degree in Physics (a.y. '22/'23, '23/'24)
  In collaboration with prof. N. Fornengo (dep. of Physics)
- *"Mathematical methods and quantum mechanics"* for the B.Sc. degree in Material Sciences (a.y. '22/'23, '23/'24)
  In collaboration with prof. S. Uccirati (dep. of Physics)

University of Pavia - IT

- Teaching assistant for the course *"Quantum Electrodynamics"* in the M.Sc. degree in theoretical physics (a.y. 2021/'22).
  References: prof. A. Bacchetta (U. of Pavia)
- Teaching assistant for the course *"Presentation making and public speaking"*, available for students across different disciplines and Master degrees (a.y. 2020/'21, 2021/'22)
  References: prof. A. Bacchetta and prof. G. Mainino (U. of Pavia)
- Teaching assistant for the course *"Methods and models for business management"* in the Master degree in Economics (a.y. 2011/'12).
  Teacher: prof. F. Francavilla (U. of Pavia).
- Teaching assistant for the course *"Methods and models for economic choices"* in the Master degree in Economics (a.y. 2011/'12).
  Teacher: prof. F. Francavilla (U. of Pavia).
- Teaching assistant for the course *"Electromagnetic phenomena"* in the B.Sc. degree in Mathematics (a.y. 2009/'10).
  Teachers: prof. G. Giuliani and prof. E. Vitali (U. of Pavia)

Vrije Universiteit Amsterdam (VU) and Universiteit van Amsterdam (UvA) - NL

- Teaching assistant for the *"Electrodynamics and theory of relativity"* course in the B.Sc. program in Physics at VU (a.y. 2012/13 and 2013/14).
  Teacher: Prof. H.G. Raven (VU, Nikhef).
- Teaching assistant for the *"Quantum field theory"* course in the joint M.Sc. program in theoretical physics between VU and UvA (a.y. 2012/13 and 2013/14).
  Teacher: prof. P.J.G. Mulders (VU, '12/'13), prof. A. Castro Anich (UvA, '13/'14).

Topical schools

- *Hampton University Graduate School (HUGS) 2021* - Jefferson Lab, Newport News (USA)
  Lectures on "Transverse Momentum Imaging" (link to teaching material)
  School director: prof. A. Accardi
- Hampton University Graduate School (HUGS) 2018 and 2019 - Jefferson Lab, Newport News (USA)
  Recitation sessions - TMD physics
  School director: prof. A. Accardi

- TMD Collaboration Summer School 2017 - Temple University, Philadelphia, PA (USA)
  Lectures on "TMD phenomenology" (in collaboration with A. Bacchetta) (link to teaching material)
  Organizer: TMD collaboration.

Qualifications

March 2023 University of Turin - "IRIDI Start 6" program
Quality teaching in presence and at a distance, evaluation and inclusion

Course dedicated to building innovative teaching, evaluation, and inclusion skills. Open badge available via the Bestr platform.

November 2020 MIUR - Italian Ministry of Education, University, and Research
Abilitazione Scientifica Nazionale

Research and teaching habilitation in theoretical particle physics for the role of Associate Professor (Italy).
Validity: 11 years. Public results available at https://asn18.cineca.it/pubblico/miur/esito-abilitato/02%252FA2/2/5

Mentoring and supervision

Supervised students:

- [2023] A. Minotti (BSc, U. of Turin) - project: the Sivers effect in atomic Compton scattering
- [2020-*] D. Manna (PhD candidate, U. of Michigan) - project: T-odd effects from QCD to atomic physics

I contributed to the mentoring of the following students:

- [2021-2022] L. Rossi (PhD, Pavia U.) - project: jets in Semi-Inclusive Deep-Inelastic Scattering
- [2021-2022] M. Cerutti (PhD, Pavia U.) - projects: TMD distributions and hadronization
- [2020-2021] C. Bissolotti (PhD, Pavia U.) - projects: TMDs in SIDIS and e^+e^- annihilation
- [2017-2019] M. Grewal (BSc, UCLA) - project: predicitive power of TMD distributions

Appointments and scientific services

Peer-review

I serve as a *referee* for the following scientific journals (ranked by impact factor):

- Physical Review Letters (PRL)
- Physical Review D (PRD)
- The European Physical Journal C - Particles and Fields (EPJ-C)
- Physics Letters B
- The European Physical Journal A - Hadrons and Nuclei (EPJ-A)
- Chinese Physics C

I was asked to review **grant proposals** by the following funding agencies:

- U.S. Department of Energy - Office of Science (USA)
- National Science Center (Poland)
- FONDECYT (Chile)

Organization of conferences and workshops

- Electron Ion Collider Users Group - EICUG
  Member of the "Electron-Ion Collider Talks Committee" (01/2023 - 12/2024)

- 25^{th} international spin physics symposium - SPIN 2023 (Duke U., NC - USA)
  Convener for the session "3D structure of the nucleon: TMDs"

- INT 21-80W: Fragmentation functions and nucleon structure - FF2021 (online)
  Member of the organizing committee

  Workshop hosted by the Institute of Nuclear Theory (INT, Seattle WA, USA). The workshop proposal has been reviewed and accepted by the related National Advisory Committee.
  See https://www.int.washington.edu/programs-and-workshops for a list of the funded workshops and programs.

- QCD-N 2021: 5^{th} workshop on the QCD structure of the nucleon (Bilbao, ES)
  Member of the organizing committee

  The main focus of this series of workshops is the investigation of the multi-dimensional nucleon structure and related topics in quantum chromodynamics. This edition emphasizes the recent progress in the field from theory, lattice QCD, phenomenology, as well as new developments coming from synergies with Quantum Information Science.

- Light Cone 2018 Conference (Jefferson Lab, VA - USA)
  Member of the organizing committee and convener

  The Light Cone Conferences belong to a series of meetings that started in 1991 and played an important role in promoting the research towards a rigorous description of hadrons and nuclei.

- QCD Evolution workshops
  Member of the organizing committee (OC) and convener (C) for the QCD Evolution workshops, a series of meetings aimed at deepening our understanding of hadron structure combining theoretical and experimental efforts.

  3. [OC/C] QCD evolution workshop 2019 - Argonne National Laboratory, IL - USA

2. [OC/C] QCD evolution workshop 2017 - Jefferson Lab, VA - USA
1. [OC/C] QCD evolution workshop 2016 - Nikhef, NL

- Resummation-Evolution-Factorization (REF) workshops
  *Member of the organizing committee (2013 - 2015) or advisory committee (2015 - *)* for a series of workshops on the connection between transverse-momentum-dependent distributions (TMDs) and unintegrated distributions (uPDFs) and on the role of Resummation, Evolution, Factorization (REF) in high-energy physics.
  Most recent workshop: REF 2023 - Universidad Complutense de Madrid, ES

Other services

Aug. 2017 - Aug. 2018 Jefferson Lab - Theory Center
Member of the organizing committee for the Theory Seminars 2017-2018
Selection of topics, speakers, local support.

Apr. 2014 - Jun. 2014 ProVU - PhDs and postdocs organization at VU
Member of the organizing committee for the PhD Day 2014 at VU: "Science, connecting people"
Event held on 25/06/2014 - established contacts with non-academic institutions, e.g. Shell, Roland Berger, Amsterdam University Press, Amsterdam Center for Entrepreneurship.

Nov. 2013 - Oct. 2016 Nikhef Theory Group
Member of the organizing committee of the monthly "Factor Society" meetings
A series of informal talks and discussions about factorization theorems in QCD, part of the educational activities within the Theory Group at Nikhef.

Nov. 2013 - Jan. 2014 Dutch Research School in Theoretical Physics (DRSTP) - Educational Board
Assisting Prof. dr. J.W. van Holten and Prof. dr. S. Ando in organizing the THEP school 2014
Selection of topics and speakers.

Nov. 2012 - Nov. 2015 Dutch Research School in Theoretical Physics (DRSTP)
Member of the Ph.D. council - representative of Vrije Universiteit Amsterdam
Active participation in the annual meetings of the PhD council, member of the organizing committees for the annual "PhD Day" and the bi-annual "Trends in Theory" meeting.

IT skills

- *Operating systems*: Unix environment, Mac OS, Windows
- *Programming languages*: C/C++, FORM, Fortran, HTML, Mathematica, Python

Languages

- **Italian**: native speaker
- **English**: full working proficiency (C2 level EF SET certificate - May 2018)
- **Dutch**: first intermediate A2+ level

Courses and certificates

- EF SET certificate: C2 level (May 2018)
- VU-NT2 - Nederlands voor werk en studie. First intermediate level A2+ (May-July 2015)
- First Certificate in English - B level (June 2005 - without expiration)

Outreach

My interests include **scientific writing**, for which I have taken specific classes at University of Pavia, and **outreach presentations**.

Written contributions to websites and magazines:

- *Eureka*, science online issue of Corriere del Ticino, Swiss newspaper
- *Meridiana*, magazine of the Ticinese Astronomical Society
- *Quaderni Borromaici*, Italian magazine of the Almo Collegio Borromeo in Pavia, IT (title of the contribution: "*Femtostrutture: e pluribus unum*")
- *Quantum Diaries*, the blog of the Interactions Collaboration, a communication resource from the world's particle physics laboratories

Oral presentations:

- *La forza (più) forte e il cuore della materia* (slides - Italian only). Outreach presentation to high school students in the context of the "Ten days physics for teenagers" program organized by the University of Pavia (Pavia, IT) - Sept. 9^{th}, 2021
- *The proton in 3D: unravelling the world within* (video and slides). Public lecture in the framework of the STRONG 2020 European program, Oct. 1^{st} 2021, Youtube live event
- *Quantum mechanics in micro and macro world* (Ten days physics for teenagers, U. of Pavia), June 20^{th} 2012

Moreover, I contributed to the following **outreach programs**:

- European Researchers' Night 2021 (Pavia, IT), year 2021
- Nikhef Open Day (Amsterdam, NL), year 2013, 2014, 2015, 2016
- Ten days physics for teenagers (U. of Pavia, IT), year 2012 and 2021

Other interests

- Supporting **Youth for Understanding**, association advancing intercultural understanding through educational exchanges for youth, families and communities (VA, USA, 2017-2020)
- Volunteering for **Aaneen**, association supporting social integration in the Netherlands (Amsterdam, 2015-2016)
- Experiences with boy scouts and other educational activities involving adolescents (Cremona, Italy)
- Cycling, trekking, cooking, reading, photography

References

(listed in alphabetic order)

Name	Alberto Accardi
Institution	Hampton University Jefferson Lab
Position	Associate professor of physics
Contact	accardi@jlab.org

Name	Christine Aidala
Institution	University of Michigan
Position	Professor of physics
Contact	caidala@umich.edu

Name	Alessandro Bacchetta
Institution	University of Pavia and INFN
Position	Professor of physics
Contact	alessandro.bacchetta@unipv.it

Name	Mariaelena Boglione
Institution	University of Turin and INFN
Position	Associate professor of physics
Contact	boglione@to.infn.it

Name	Ian Cloët
Institution	Argonne National Laboratory
Position	Physics Division Theory Group leader
Contact	icloet@anl.gov

Name	Leonard Gamberg
Institution	Penn State University
Position	Professor of Theoretical Physics
Contact	lpg10@psu.edu

Name	Piet Mulders
Institution	Vrije Universiteit and Nikhef
Posizione	Professor of Theoretical Physics (PhD advisor)
Contact	p.j.g.mulders@vu.nl

Name	Jian Wei Qiu
Institution	Jefferson Lab
Position	Associate director for Theoretical and Computational Physics and Theory Center Director
Contact	jqiu@jlab.org

Name	Marco Radici
Institution	INFN
Position	Senior researcher and professor of physics
Contact	marco.radici@pv.infn.it