Arturo de Giorgi

updated: September 19, 2023

Personal Data

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About me

I am a very energetic and active person. I like to be an all-round person, curious, looking for the interesting in every aspect and possibility that life offers: science, sports, languages, music and dance, the development of a startup and, of course, free time. I learnt how to organize and plan efficiently my duties and to control and overcome stress. Working in a startup for more than six years and collaborating as a Tutor as well as in papers, has given me the possibility to learn how to work in a team and get along with people at work.

Research Interests

Theoretical particle physics - Phenomenology. During my PhD, I developed the idea that the various SM problems/puzzles are difficult to solve from disconnected areas of new physics. I have therefore tried to keep a broad view of different types of phenomenology that I intend to try to explore and combine.

Key-Words: *ALPs, Axion, Higgs, 2HDMs, Flavour Physics, Flavour Symmetries, Majorons, Heavy Neutral Leptons (HNLs), Neutrino masses, Extra-Dimensions, Dark Matter (DM).*

ALPs/Axions

Physics of Psudo-Goldstone Bosons, UV-Theories with calculable (e.g. loop-induced) ALP-mass generation, Majoron models for Neutrino masses, ALP-HNLs phenomenology (e.g. JALZ).

Higgs

New Physics in Higgs/Yukawa sector and effect of Flavour symmetries, Models with more than one Higgs doublet, e.g. 2HDMs.

Flavour

Model building for Flavour anomalies (e.g. $(g-2)_\mu$, M_W, B-Anomalies) assessing the possibility of plausible models, e.g. HNLs, ALPs, etc..

Extra-Dimensions

Physics of Massive Gravitons, studies of Unitarity of such theories, and applications to DM.

Education and Academic Stays

Education

09/2021 09/2024	Ph.D. in Physics at Instituto de Física Teórica (IFT UAM/CSIC), Madrid Advisor: Prof. Dr. Luca Merlo
10/2018 12/2020	Master of Science in Physics at Ludwig-Maximilians-Universität, Munich Final Grade: 1.02/1.00 Thesis: "Dark Matter Production in Warped Extra-Dimensions" Advisor: Dr. Habil. Georg Raffelt, Co-advisor: JProf. Stefan Vogl
09/2015 07/2018	Bachelor of Science in Physics at Università degli Studi di Padova, Padua Final Grade: 109/110 Thesis: "Non-Abelian Anyons and Quantum Computation" Advisor: Prof. Dr. Pieralberto Marchetti Gpa: 28.33/30

Academic Stays

Only stays $\gtrsim$ 1 month are reported.

10/2023 12/2023	Visitor at Ruprecht-Karls-Universität Heidelberg, Heidelberg
06/2023 08/2023	Visitor at Harvard University, Boston
04/2023	Visitor at Ruprecht-Karls-Universität Heidelberg, Heidelberg
05/2021 08/2021	Research Internship at ETH, Zurich on Machine Learning and Phase Transitions in the group led by *Prof. Dr. M.K. Marinkovic*
12/2019 11/2020	Student Research Assistant at Max Planck Institut für Physik, Munich on Dark Matter Production in Warped Extra-Dimensions supervised by *JProf. Dr. S. Vogl*

Scholarships and Awards

Scholarships

09/2021 | Doctoral Grant - European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska Curie grant agreement No 860881-HIDDeN as Early Stage Researcher (ESR)
See: hiddeneu.eu

03/2016 | Scholarship for highschool graduate students "**Premio Gelati**" for best research project

Awards

09/2023 | 1st Prize in Poster Competition at Invisible23 School

07/2022 | Best Poster Presentation in Poster Competition at Invisible22 Workshop

Projects and Networks

09/2021 – Today | HIDDeN
European ITN project (H2020-MSCA-ITN-2019//860881-HIDDeN)
See: hiddeneu.eu

11/2022 – Today | COSMIC WISPers
COST Action CA21106
See: cosmicwispers.eu

09/2023 – Today | COMETA
COST Action CA22130
See: cost.eu/actions/CA22130/

Conferences and Workshops

In my career, I have participated in 7 conferences in 7 countries, of which 7 as a speaker: 5 in parallel sessions and 2 in PhD Forums in Plenary Session.

09/2023 | **Invisibles23 Workshop** at University of Göttingen, Germany
Role: PhD Forum in Plenary Session
Title: *Down to the Seesaw Line via the JALZ ALP-HNL Portal*

08/2023 | **21st Lomonosov Conference** at Moscow State University, Russia
Role: Parallel Session
Title: *The low-scale seesaw solution to the M_W and $(g-2)_\mu$ anomalies*

05/2023 | **Planck 2023** at Warsaw, Poland
to the Electroweak Scale
Role: Parallel Session
Title: *BSM and 2HDM: update, prospects and a bridge to ALPs*

03/2023 | **57th Rencontres de Moriond 2023** at La Thuille, Italy
Session: Electroweak Interactions & Unified Theories
Role: PhD Forum in Plenary Session
Title: *The Low Seesaw Scale Solution for M_W and $(g-2)_\mu$*

06/2022 | **Invisibles22 Workshop** at IJCLab, Orsay, France
Role: PhD Forum in Plenary Session
Title: *BSM flavoured correlations*

09/2021 | **DESY Theory Workshop** at DESY, Hamburg, Germany
Role: Parallel Session
Title: *Spin-2 mediated Dark Matter in Warped Extra-Dimensions*

05/2021 | **2021 Phenomenology Symposium** at University of Pittsburgh, Pittsburgh, USA
Role: Parallel Session
Title: *Spin-2 mediated Dark Matter in Warped Extra-Dimensions*

Invited Seminars

6. *Down to the Seesaw Line via the JALZ ALP-HNL Portal*. Harvard University, June, 2023
5. *An old and a new opportunity for ALP physics*. Karlsruher Institut für Technologie, June, 2023
4. *An Opportunity in the ALP-HNLs Sector*. COST Cosmic WISPers - WG1 Meeting, May, 2023
3. *A "Piece" Beyond HNLs*. Albert-Ludwigs-Universität Freiburg, May, 2023
2. *BSM Higgs Flavoured Correlation*. LHC Higgs Working Group - Common WG2 and WG3 – CP violation and Higgs Sector, June, 2022
1. *Spin-2 mediated Dark Matter in Warped Extra-Dimensions*. Albert-Ludwigs-Universität Freiburg, July, 2021

Schools

08/2023 | Doctoral School in Invisibles23 School
at University of Göttingen, Germany

06/2022 | Doctoral School in Invisibles22 School
at IJCLab, Orsay, France

03/2021 | Doctoral School in Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation
at Galileo Galilei Institute for Theoretical Physics, Florence, Italy

Teaching Experience

10/2020 12/2022	Tutor for Master course at Ludwig-Maximillian-Universität Müenchen for Classical and Quantum Simulations of Physical Systems held by *Prof. Dr. M.K. Marinkovic*
07/2022 09/2022	Tutor for Master course at Ludwig-Maximillian-Universität Müenchen for Introduction to Lattice Gauge Theories held by *Prof. Dr. M.K. Marinkovic*
10/2019 03/2020	at Ludwig-Maximillian-Universität Müenchen for Quantum Mechanics II held by *Prof. Dr. V. Mukhanov*

Organisation and Responsibilities

01/2023 Today	COSMIC WISPers monthly Colloquium Role: Organiser
05/2022	Extended Workshop NuTs (Neutrino Theories) 2022 Role: Junior Organizing Committee Institute for Theoretical Physics (IFT), Madrid, Spain

List of Publications

In my career, I have produced 10 papers (2 before the beginning of the PhD) and 1 proceeding. I have collaborated with 11 researchers, 5 of which outside my institution.

Motivated by great curiosity, **I proposed the line of research** involving ALP and HNLs interactions, which my supervisor agreed to follow in a series of works.

My works collected 47 citations, with an average of 4.3 per paper, granting an h-index of 5.

Note: in **all** the works below, I have been active part and focused on the **core part of the calculations**, rather than the writing part.

Papers

10. A. de Giorgi, F. Koutroulis, L. Merlo, and S. Pokorski, *Flavour and Higgs physics in Z2-symmetric 2HD models near the decoupling limit*, Nucl. Phys. B **994** (2023) 116323, [arXiv:2304.10560]
9. A. de Giorgi, L. Merlo, and J.-L. Tastet, *Probing HNL-ALP couplings at colliders*, Fortsch. Phys. **71** (2023), no. 4-5 2300027, [arXiv:2212.11290]
8. A. de Giorgi and G. Piazza, *A lesson from $R_{\tau\tau}^{K^{(*)}}$ and $R_{\nu\nu}^{K^{(*)}}$ at Belle II*, arXiv:2211.05595

7. J. Bonilla, A. de Giorgi, and M. Ramos, *Neutral B-anomalies from an on-shell scalar exchange*, arXiv:2211.05135

6. A. de Giorgi, L. Merlo, and S. Pokorski, *The Low-Scale Seesaw Solution to the M_W and $(g-2)_\mu$ Anomalies*, Fortsch. Phys. **71** (2023), no. 4-5 2300020, [arXiv:2211.03797]

5. J. Bonilla, A. de Giorgi, B. Gavela, L. Merlo, and M. Ramos, *The cost of an ALP solution to the neutral B-anomalies*, JHEP **02** (2023) 138, [arXiv:2209.11247]

4. A. de Giorgi and S. Vogl, *Warm dark matter from a gravitational freeze-in in extra dimensions*, JHEP **04** (2023) 032, [arXiv:2208.03153]

3. J. Alonso-Gonzalez, A. de Giorgi, L. Merlo, and S. Pokorski, *Searching for BSM physics in Yukawa couplings and flavour symmetries*, JHEP **05** (2022) 041, [arXiv:2109.07490]

2. A. de Giorgi and S. Vogl, *Dark matter interacting via a massive spin-2 mediator in warped extra-dimensions*, JHEP **11** (2021) 036, [arXiv:2105.06794]

1. A. de Giorgi and S. Vogl, *Unitarity in KK-graviton production: A case study in warped extra-dimensions*, JHEP **04** (2021) 143, [arXiv:2012.09672]

Proceedings

1. A. de Giorgi, L. Merlo, and S. Pokorski, *Low Seesaw Scale Solution for M_W and $(g-2)_\mu$*, in *57th Rencontres de Moriond on Electroweak Interactions and Unified Theories*, 4, 2023. arXiv:2304.08438

Outreach

1. Speaker for the Jornadas de la Física at the Parque de Atracciones de Madrid for ~ 1200 students [08-March-2023].

2. A. de Giorgi, *Physics, following the breadcrumbs of our intuition*, February, 2022. [Online; posted 08-February-2022]

Non-Scientific Activities

Today May 2023	Member of **Rotaract** Madrid Serrano. Community service organization, focused also on international service projects, in a global effort to bring peace and international understanding to the world.
Today May 2023	Mentor at **Lead the Future**. Non-profit STEM mentorship organisation based on the spirit of the 'Give Back', to engage for the good of the community for free and without expecting anything in return.
September 2022 May 2023	Member of IFT **Equity, Diversity and Inclusion Committee**. Committee aimed to provide an inclusive and welcoming working environment for all. See: EDI@IFT
July 2014 October 2021	Founder and CAO of **Artupia** In 2014 I started working with two dear friends at a Startup, Artupia, on the algorithm side as CAO, in a quest to globally revolutionise the world of Art.

	All this has led to solid group work, to learn new tools never used before for image creation and social management, to learn how to code in different programming styles and to learn the basics of marketing and design.
2012 - 2015	Member and Events Coordinator of the Highschool Club **Europeanclubeuropeo**. Club geared towards enhancing awareness of EU values of peace and cooperation among nations.

Languages and Computer Skills

Languages

Italian:	Mothertongue
English:	Fluent
Spanish:	Good Knowledge
German:	Basic Knowledge
French:	Basic Knowledge

Computer Skills

Basic Knowledge:	html, CSS, PHP
Intermediate Knowledge:	Phyton, C++, FeynCalc, FeynRules, xAct, Flavio
Advanced Knowledge:	Mathematica, LaTeX

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