

Jaime Hoefken Zink

Nationality: German **Date of birth:** 31/07/1984 **Gender:** Male **Phone number:** (+39) 0512091004

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Work: Via Irnerio 46, 40126 Bologna (Italy)

EDUCATION AND TRAINING

PhD in Physics

Alma Mater Studiorum - Università di Bologna [01/11/2021 – Current]

City: Bologna

Country: Italy

Website: <https://www.unibo.it/it>

Supervisor: prof Silvia Pascoli

Master of Science in Physics

Pontificia Universidad Católica del Perú [08/2016 – 07/2020]

City: Lima

Country: Peru

Website: <https://www.pucp.edu.pe/>

Final grade: 19.1 / 20.0

Thesis: Effects of the Violation of the Equivalence Principle at DUNE

Advisor: prof Alberto Gago Medina

Bachelor of Arts in Philosophy

Universidad Antonio Ruiz de Montoya [03/2006 – 03/2016]

City: Lima

Country: Peru

Website: <https://www.uarm.edu.pe/>

PUBLICATIONS

[A panorama of new-physics explanations to the MiniBooNE excess](#)

[2023]

Abdullahi, A. M., Zink, J. H., Hostert, M., Massaro, D., & Pascoli, S.

I was in charge of modelling the interactions in the detector and with the dirt, the decays (in and out of the detector), the geometry of the detector and the dirt. I also did the fitting and produced the data for the plots. Furthermore, I helped writing the section of the different models that could explain MiniBooNE Low Energy Excess (MB LEE).

[Exploring the dark sectors via the cooling of white dwarfs](#)

[2023]

Hoefken Zink, J., & Ramirez-Quezada, M. E. Physical Review D, 108(2306.00517).

I was in charge of building the model, computing the plasmon decay (analytically and numerically) and luminosities for different parameters of the model.

[DarkNews: a Python-based event generator for heavy neutral lepton production in neutrino-nucleus scattering](#)

[2022]

Abdullahi, A. M., Zink, J. H., Hostert, M., Massaro, D., & Pascoli, S.

I was in charge of building the geometry of the detectors and two kinds of analyses: the reweighting of events considering the decay of the heavy neutral leptons and the detector response.

Effects of the Violation of the Equivalence Principle at DUNE

[2020]

Díaz, F. N., Hoefken, J., & Gago, A. M. Physical Review D, 102(5), 055020.

I was in charge of finding the formulae and wrote a simulator in C++ to do the fittings and compute the sensitivities.

CONFERENCES AND SEMINARS

TeV Particle Astrophysics (TeVPA)

[Naples, Italy, 11/09/2023 – 15/09/2023]

I presented a 15' talk about white dwarf cooling through dark sector physics.

Link: <https://agenda.infn.it/event/33457/>

SUSY 2023

[University of Southampton Highfield Campus, Southampton, UK, 17/07/2023 – 21/07/2023]

I presented a 20' talk about Dark sectors MiniBooNE Low Energy Excess.

Link: <https://indico.cern.ch/event/1214022/>

Gravity Waves at NANOGrav and interpretations

[Bologna, Italy, 13/07/2023]

I gave a 20' talk at the HEP Bologna Journal club about the recent results from NANOGrav. I was in charge of presenting what had been measured and the methods NANOGrav used to compute the gravitational waves. Presentation also done with prof Filippo Sala and Alessandro Granelli.

Link: <https://sites.google.com/view/bolognahepjc/home?authuser=0>

Third EuCAPT Annual Symposium

[CERN, Geneva, Switzerland, 31/05/2023 – 02/06/2023]

I presented a 6' talk about Dark sectors MiniBooNE Low Energy Excess and a poster about white dwarf cooling through dark sector physics.

Link: <https://indico.cern.ch/event/1218730/>

25th Planck conference in the series "From the Planck scale to the electroweak scale"

[Warsaw, Poland, 22/05/2023 – 26/05/2023]

I presented a 20' talk about Dark sectors MiniBooNE Low Energy Excess.

Link: <http://indico.fuw.edu.pl/conferenceDisplay.py?confId=68>

Star cooling and plasmon decay in white dwarfs

[Bologna, Italy, 16/03/2023]

I gave a 45' talk about plasmon decay in white dwarfs in the HEP Journal Club at the University of Bologna.

Link: <https://sites.google.com/view/bolognahepjc/past-topics?authuser=0>

FIPs Workshop

[CERN, Geneva, Switzerland, 17/10/2022 – 21/10/2022]

Topics: MeV-GeV Dark Matter, Heavy neutral leptons and their connection to active neutrino physics, and Ultra-light (< 1 eV) FIPs (feebly interacting particles).

Link: <https://indico.cern.ch/event/1119695/>

International Conference on High Energy Physics, ICHEP

[Bologna, 06/07/2022 – 13/07/2022]

I gave a 16' talk about the dark model and how it explains MiniBooNE Low Energy Excess (MB LEE).

Link: <https://www.ichep2022.it/>

Invisibles Workshop

[IJCLab, University Paris Saclay/Orsay Campus, Paris, 20/06/2022 – 24/06/2022]

I gave a 6' talk and presented a poster on an explanation of MiniBooNE low energy excess through dark sectors (heavy neutral leptons and a dark photon as mediator).

Link: <https://indico.ijclab.in2p3.fr/event/7686/>

Neutrino 2022

[Seoul, South Korea (online), 30/05/2022 – 04/06/2022]

I presented a poster on an explanation of MiniBooNE low energy excess through dark sectors (heavy neutral leptons and a dark photon as mediator).

Link: <https://neutrino2022.org/>

TECHNICAL SKILLS

Programming languages

Python, Wolfram Mathematica, C++/C, FORTRAN, basics of Julia.

HEP resources

- Coauthor of DarkNews, used for BSM physics.
- GLoBES, CRPropa, FindBounce, ROOT/PyROOT.

PROCEEDINGS

Neutrinos and Dark Sectors

Hoefken Zink, J., & Pascoli, S. (2022, June). Neutrinos and Dark Sectors. In *Conference on Flavor Physics and CP violation* (pp. 83-98). Cham: Springer International Publishing.

Mass composition modelling at sources of ultra-high energy cosmic rays

Olivares Schneider, J., Hoefken Zink, J., & Bazo Alba, J. L. (2022). Mass composition modelling at sources of ultra-high energy cosmic rays. In *The European Physical Society Conference on High Energy Physics. 26-30 July 2021. Online conference* (p. 89).

<https://ui.adsabs.harvard.edu/abs/2022epsc.confE..89O/abstract>

I used CRPropa to simulate cosmic rays from more than 60 thousand weighted sources and fit the results to Pierre Auger considering different compositions, indices and cuts. Talk presented by Prof José Bazo at The European Physical Society Conference on High Energy Physics.

Link: <https://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=398>

SCHOOLS

12th International Neutrino Summer School 2019

[05/08/2019 – 16/08/2019]

I also presented a poster on the effects of the violation of the Equivalence principle at DUNE.

Link: <https://indico.fnal.gov/event/19346/>

ESCAPE Summer School (online)

[07/06/2021 – 18/06/2021]

Link: <https://indico.in2p3.fr/event/20306/>

International PhD Summer School on Neutrinos: Here, There & Everywhere

[05/07/2021 – 09/07/2021]

Organized by the Niels Bohr International Academy (NBIA).

Link: <https://indico.nbi.ku.dk/event/1532/>

Invisibles School

[13/06/2022 – 17/06/2022]

At IJCLab, University Paris Saclay/Orsay Campus, Paris. The school was mainly about neutrinos and dark matter. I presented a poster on an explanation of MiniBooNE low energy excess through dark sectors (heavy neutral leptons and a dark photon as mediator).

Link: <https://indico.ijclab.in2p3.fr/event/7654/>

Invisibles School

[21/08/2023 – 26/08/2023]

At Bad Honnef, Germany. I presented a poster on white dwarf cooling through plasmon decay with a dark photon mediator.

Link: <https://indico.cern.ch/event/1259858/>

TRISEP (Tri-Institute Summer School on Elementary Particles)

[19/06/2023 – 30/06/2023]

At Perimeter Institute, Ontario, Canada. I presented a poster on white dwarf cooling through plasmon decay with a dark photon mediator.

Link: <https://events.perimeterinstitute.ca/event/42/>

CosmoLattice School (online)

[25/09/2023 – 29/09/2023]

Link: <https://indico.ific.uv.es/event/7055/>

WORKING PERIODS ABROAD

Universidad de Barcelona, Barcelona, Spain

[01/11/2023 – 31/01/2024]

I will work with prof María Concepción González-García on neutrino physics and collaborate with her research group.

Perimeter Institute, Waterloo, Canada

[26/09/2022 – 01/10/2022]

I worked with the postdoc researcher Matheus Hostert on modeling the interactions of neutrinos with the material surrounding the detector of MiniBooNE and MicroBooNE and had useful discussions about Effective Field Theories.

University of Columbia's laboratory: Nevis, NY, USA

[22/08/2022 – 24/09/2022]

I worked with prof Georgia Karagiorgi and prof Michael Shaewitz in looking at the effects of new dark physics at the SBN program and modeled the BNB neutrino fluxes over different angles and energies.

LANGUAGES

Advanced level

Spanish, English, German, Italian

Intermediate level

French, Dutch

Translator level

Ancient Greek

WORK EXPERIENCE

Research fellow: ESR PhD position from HIDDev

Alma Mater Studiorum - Università di Bologna [01/10/2021 – Current]

Address: Via Irnerio, 46, 40126 Bologna (Italy)

- Do research with prof Silvia Pascoli and other collaborators in diverse fields: neutrino physics, dark sector physics, astro-particle physics.
- Assist prof Pascoli with the course of Theoretical Astroparticle Physics for master students.
- Co-supervise three master students of prof Pascoli.
- Present the results of my research in conferences.
- Collaborate with other research nodes of the project HIDDev (<https://hiddeneu.eu/>).
- Take part in the activities of INFN Bologna, to which I am affiliated.

Teaching and researcher assistant

Pontificia Universidad Católica del Perú [01/08/2016 – 31/08/2021]

Address: Av. Universitaria 1801, San Miguel, 15088 Lima (Peru)

- Do research within the field of neutrinos, theory and phenomenology, in the PUCP-High Energy Physics Group, assisting Dr. Alberto Gago. Topics: neutrino oscillation with decoherence effects, neutrino oscillation in curved space-times, violation of Equivalence Principle and Lorentz violation at DUNE, decay of the muon within the Very Special Relativity framework.
- Assist in courses Physics I, II and III, for physicists and engineers.

Lecturer

Universidad Del Pacífico [01/03/2016 – 31/08/2021]

Address: Jr. Gral, Jirón Luis Sánchez Cerro 2141, Jesús María, 15072 Lima (Peru)

- Teach Philosophy (2016-2017).
- Teach Pre-calculus (2018-2021).
- Direct the team of lecturers and organize the course of Philosophy.

Language teacher

Universidad Antonio Ruiz de Montoya [01/10/2015 – 20/12/2017]

Address: Av. Paso de Los Andes 970, Pueblo Libre, 15084 Lima (Peru)

- Teach English as a foreign language for B1+ students as part of the program of the career of Tourism.

Jesuit student

Society of Jesus [04/03/2004 – 20/07/2014]

City: Lima

Country: Peru

- Direct and organize different groups aimed to educate people in different fields.
- Taught philosophy and Ancient $\kappa\omicron\upsilon\lambda\epsilon$ Greek to students in formation to become priests.

- Worked on the translation of 4th/5th-century manuscripts from Greek to Spanish.
 - Received Jesuit formation for 10 years.
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