Kevin Thieme

Postdoctoral Researcher in Experimental Astroparticle Physics

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Postdoctoral Appointments

Apr. 2025–today — **Research Assistant**, University of Oxford, Department of Physics, UK
Supervisors: Kimberly Palladino, Hans Kraus
Junior Research Fellow, Wolfson College, Oxford, UK (since Jan. 2026)
Collaborations: LUX-ZEPLIN (LZ), XLZD and MIGDAL

Jan. 2022–Apr. 2025 — **Research Fellow/Associate**, University of Hawai'i at Mānoa, Department of Physics and Astronomy, USA
Supervisor: Jelena Maricic
Associated Member, European Organization for Nuclear Research (CERN), Neutrino Platform, CH (host institute)
Supervisor: Hanguo Wang (UCLA)
Collaboration: DarkSide-20k – Co-leading WBS with Guillaume Plante (Columbia)

Education

Nov. 2017–Dec. 2021 — **Dr. sc. nat.**, University of Zurich, Department of Physics, CH
PhD thesis: *The Low-Energy and Large-Scale Frontier of Dual-Phase Xenon Time Projection Chambers for Dark Matter Search* (with distinction, Faculty of Science)
Advisor and committee chair: Laura Baudis
Committee: Patricia Sánchez-Lucas, Marc Schumann, Nicola Serra
Collaboration: DARWIN

Sep. 2015–Jun. 2017 — **MSc. ETH Physics**, ETH Zurich, Department of Physics, CH
Master thesis: *Null Lagrangians and Noether's theorem for non-local field theories*
Advisors: Niklas Beisert, Daniele Oriti, Alexander Kegeles

Sep. 2012–Sep. 2015 — **BSc. ETH Physics**, ETH Zurich, Department of Physics, CH
Semester thesis: *Vibration measurement at the PSI nEDM-experiment*
Advisors: Klaus Stefan Kirch, Sybille Komposch, Jochen Krempel

Jun. 2012 — **University entrance diploma**, Gymnasium Coswig, GER
(with distinction, Saxon Minister of Education)

Research Stays

Apr. 2023–Mar. 2025 — INFN Laboratori Nazionali del Gran Sasso (LNGS), IT (2 months total)

Jan. 2020 — InvisiblesPlus Secondment at Columbia University in the City of New York, Department of Physics, USA
Group of Elena Aprile

Sep. 2016–Apr. 2017 — Master project at Max Planck Institute for Gravitational Physics (AEI Potsdam), GER
Division Quantum Gravity and Unified Theories, group for Microscopic Quantum Structure and Dynamics of Spacetime

Feb. 2015–Jun. 2015 — Semester project at Paul Scherrer Institute (PSI), CH
Division Research with Neutrons and Muons, group for Ultra Cold Neutron Physics

Research Experience

Postdoctoral projects

2. Postdoc: As a member of the XLZD Collaboration I am leading the technical aspects of the field cage design as part of the UK's pre-construction project. XLZD will be a next-generation dark matter detector using a 60 t to 80 t liquid xenon target in a dual-phase time projection chamber (TPC) – sensitive enough to reach the neutrino fog and with excellent prospects for the search for neutrinoless double beta decay.

Field Cage Development for XLZD

- Radiogenic background estimation
- Development and testing of novel field cage concepts with fibre-composite materials

1. Postdoc: As a member of the DarkSide-20k Collaboration I played a substantial role in advancing the development of a next-generation dark matter detector which will deploy a ~ 50 t low-radioactivity liquid argon target in a dual-phase TPC. As deputy manager of the Underground Argon Cryogenics System, I was responsible for its benchmarking and preparation for a mock-up detector test at INFN LNGS and co-led the design and planning process for its integration in DarkSide-20k. I was further involved in design and simulation efforts for the DarkSide-20k inner detector.

Underground Argon Cryogenics of DarkSide-20k

- Lead of the installation and benchmarking of the cryogenics system for mock-up test at LNGS
- Major involvement in the commissioning of the cryogenics system (RE37) at CERN
- System design: operating modes, functional logic, piping & instrumentation diagram

Inner detector of DarkSide-20k

- Design and testing of a capacitive level meter, liquid level control system and camera assembly for use in cryogenic environments for the DarkSide-20k mock-up detector
- Responsible for gas pocket formation and monitoring system of DarkSide-20k TPC
- Flow and thermal modelling of the argon volume in the DarkSide-20k TPC with CFD software ANSYS Fluent

I was also involved in R&D on a PEN-based wavelength shifting reflector, and in ProtoDUNE-HD (NP04) at CERN.

Doctoral projects

As a member of the DARWIN Collaboration and in the context of the ERC-funded project Xenoscope, I was studying the physics of low-energy interactions in liquid xenon and conducting detector and photosensor R&D towards the next-generation dark matter observatory DARWIN, a dual-phase TPC with a 40 t liquid xenon target.

Vertical DARWIN Demonstrator

- Major involvement in the development of a 2.6 m tall prototype dual-phase xenon TPC with 350 kg xenon
- Leading role in the successful commissioning phase and the first run
- Design and installation of the following subsystems: horizontal levelling system, heat exchangers, filtration and safety recuperation gas system, two independent xenon storage and recovery systems (gas and liquid), including 385 l pressure vessel with 90 bar rating
- Horizontal levelling system is a registered German utility model (DE 20 2021 101 412 U1)

Microphysics Measurements at Low Energies and Novel Photosensors

- Operation of the first dual-phase xenon TPC with SiPMs and characterisation with internal ^{37}Ar and ^{83m}Kr sources down to its energy threshold
- Measurement of the mean electronic excitation energy of liquid xenon (W-value) with calibration data and single-electron events
- Development and implementation of an efficient raw-data processing framework in C++ and ROOT for dual-phase xenon TPC with hybrid photosensor readout (SiPM/PMT)

- Design and assembly of a source insertion system for gaseous ^{37}Ar into a TPC gas system and source production in collaboration with the Laboratory for Radiochemistry at SINQ (PSI)
- Optical simulations with GEANT4 and search for external double photoelectron emission in SiPMs

Teaching and Supervision Experience

- Teaching assistant for courses on experimental physics I – IV for physics majors (4 semesters at Zurich)
- Demonstrator for laboratory courses for physics majors and veterinary medicine students (2 semesters at Zurich and 1 term at Oxford)
- Advisor for:
  - PhD students: Paolo Salomone (Sapienza University of Rome) at LNGS, Victor Goicoechea Casanueva (University of Hawai'i)
  - Master students: Nicole Schermer (Technical University of Munich) during semester project at Zurich, Paolo Salomone (Sapienza University of Rome) at CERN, Tsz (David) Wong (University of Oxford)
  - Bachelor/undergraduate students: Stefan Hochrein (University of Zurich), several summer students (Williams College) at LNGS, Bartholemew (Leo) Kavanagh (University of Oxford), Lucas Habgood (University of Oxford)

Conferences, Workshops and Seminars

21–22 Oct. 2025:	UK HEP Forum 2025: "Wandering in the Dark", Participant, Abingdon, UK
8–12 July 2024:	IDM 2024, Poster, L'Aquila, IT
23–26 May 2022:	XeSAT2022, Talk, University of Coimbra, PT
1 Feb. 2022:	XENON/DARWIN Science Club, *A Measurement of the Mean Electronic Excitation Energy of Liquid Xenon*, online
8 Oct. 2021:	INPA Seminar (LBNL Berkeley), Talk, invited, online
12–23 Jul. 2021:	ICRC 2021, Talk, online, proceedings: PoS(ICRC2021)
28–30 Aug. 2019:	LIDINE 2019, Talk, University of Manchester, UK
26–30 Aug. 2019:	SPS-ÖPG Annual Meeting, Talk, University of Zurich, CH
10–17 Jul. 2019:	EPS-HEP2019, Talk, ICC & Ghent University, BE
9–11 Jan. 2019:	ZPW2019, A New Look at Dark Matter, Participant, University of Zurich, CH
21–22 Jun. 2018:	SENSE TechForum, Poster: *Characterization of SiPMs for Use in Liquid Xenon Time Projection Chambers*, University of Geneva, CH

Outreach

- Event lead for Dark Matter Day 2025 at the University of Oxford, organising flash talks, a poster session, particle physics demonstrations, and children's science activities for an audience of over 100 members of the public.
- Public talk and lab tour at the largest Swiss Science Festival Scientifica 2021.

IT Skills

Programming:	C/C++ (proficient), Python (proficient), LabVIEW (competent)
Analysis:	ROOT (proficient)
Simulation:	ANSYS Fluent/Maxwell (expert), COMSOL Multiphysics AC/DC Module (proficient), GEANT4 (advanced beginner)
CAD:	SolidWorks (expert)
Typesetting:	LaTeX (proficient)

Languages

English: Fluent German: Mother tongue French: Basic knowledge

Activities

- Referee for European Physical Journal C and Journal of Instrumentation
- Soaring since 2008 (Glider Pilot License in 2010), duty as flight controller on glider airfield
- Tea Sommelier (Berlin Tea Academy Certificate 2024)