Dr Alexander Deisting

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Employment

Senior postdoctoral researcher, Johannes Gutenberg-Universität Mainz — *Mainz, DE*

Group of Uwe Oberlack; R&D of new electrodes for future dual-phase Xe time projection chambers (TPCs); Upgrade of the MainzTPC with SiPMs; Maintenance of the neutron veto of the XENONnT observatory; Simulations for future single-phase noble liquid detectors. May. 2022 - today

Postdoctoral researcher, Royal Holloway University of London — *London, UK*

Group of Jocelyn Monroe; R&D on high pressure TPCs with optical readout and hybrid charge and optical readout, Tests of TPC hardware for their suitability as parts of future DUNE near detector high pressure gas TPC; Development of a novel, low cost sensor to detect lead in drinking water Aug. 2018 - Apr. 2022

Postdoctoral researcher, Gesellschaft für Schwerionenforschung / Ruprecht-Karls-Universtität Heidelberg — *Darmstadt, DE / Heildelberg, DE*

Group of Silvia Masciocchi; Discharge studies with gas electron multiplier (GEMs) foils; Commissioning of the GEM testing facilities for the ALICE TPC's GEMs mass production Mar. 2028 - Jul. 2018

Education

Ruprecht-Karls-Universtität Heidelberg (Heidelberg, DE / CERN, CH) — [*10.11588/heidok.00024133*]

Dr. rer. nat. (Physics); Thesis title: "Measurements of ion mobility and GEM discharge studies for the upgrade of the ALICE time projection chamber", Supervisor: Prof. Dr. S. Masciocchi Aug. 2014 - Feb. 2018

Rheinische Friedrich-Wilhelms-Universität Bonn (Bonn, DE) — [*BONN-IB-2014-10*]

Master of Science in Physics; Thesis title: "Readout and Analysis of the Induced Ion Signal of an InGrid Detector", Supervisor: Prof. Dr. K. Desch Oct. 2012 - May. 2014

Rheinische Friedrich-Wilhelms-Universität Bonn (Bonn, DE) — [*2012-02*]

Bachelor of Science in Physics; Thesis title: "Reconstruction of charge depositions due to primary electrons in a GEM-Pixel-TPC with an algorithm used for applications in astrophysics" (translation, the thesis is written in German with the title: "Rekonstruktionen von Ladungsdepositionen in einer GEM-Pixel-TPC mit einem Algorithmus aus der Astronomie"), Supervisor: Prof. Dr. K. Desch Oct. 2008 - Sept. 2012

Leadership positions and committee work

Darwin collaboration — [*Darwin*]

Co-lead of the Darwin WG6: "LXe Properties and Calibration" together with R. Budnik, Weizmann Institute of Science May. 2023 - today

ECFA DRD2: "Liquid detectors collaboration" — [*ECFA DRD2 Proposal*]

Part of the proposal preparation team and co-lead of the task "Amplification structures, charge-to-light conversion and granular light readout of dual phase detectors" together with K. Mavrokoridis, University of Liverpool Nov. 2022 - today

AIDAinnova, Work package 7 — [*e.g. AIDAinnova Indico*]

Lead of Task 4.2: "A high pressure gas time projection chamber with optical readout for neutrino physics" 2021 - 2022

2019 - 2020: **Lead of the task: "Hybrid readout high pressure gas TPC for neutrino physics"** during the AIDAinnova proposal preparations (INFRAINNOV-04-2020) [AIDAinnova]

"PlomBox: a Device for Open-Source Metrology to Fight Lead Contamination in Drinking Water" [*EP/T015586/1, PlomBox*]

Work package coordinator: "Mobile Phone Data Acquisition"; Leading the development of a mobile phone controlled DAQ system, and of the analysis server set-up for the future PlomBox devices — 2020 - 2022

DUNE near detector high pressure gas TPC development

Leading the tests of an ALICE outer readout chamber to assert its suitability for high pressure operation in the UK — 2019 - 2022

Development of a high pressure gas time projection chamber with hybrid charge and optical readout

Co-leading the research effort with the 1 m^3 high pressure gas TPC prototype — 2018 - 2022

"Materia Oscura: Instrumentation Development to Observe the Invisible" [*ST/R002908/1*]

Leading the research exploring lead detection in drinking water using CMOS sensors — 2018 - 2020

Grants and Funding Awards

STFC Early Technology Development Capital Funding 152 000 £; [*ST/W005727/1*]

"Infrastructure Request for High Pressure Gas TPC Development Studies for the DUNE Near Detector", together with G. Barker, X. Lu, University of Warwick — 2022

AIDIAinnova 66 666 £

European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No 101004761. Funding secured at Royal Holloway University of London (*cf.* Leadership and committee work: AIDAinnova proposal preparations) — 2021

Royal Holloway, University of London, *Strategic knowledge exchange* grant 20 000 £

Project title: "Explore the commercialisation of a device with a CMOS sensor at its heart for dosimetry applications" — 2020

Nuclear Security Sciences Network, Personal Development Grant 1 000 £

Funding to visit the 2020 IEEE in Manchester — 2019

Collaborations

XENONnT

Maintenance of the neutron veto, development of new electrodes — May 2022 - today

Darwin

WG6 working group co-leader (cf. Leadership and committee work: Darwin), concept studies of single-phase liquid xenon TPCs, development of electrode assay techniques — May 2022 - today

ARIADNE+

DAQ control GUI development and contributions to the assembly of the light readout plane of the 2×2 m^2 demonstrator of TimePix3 readout of a dual-phase argon TPC — 2022

DUNE

Near detector high pressure gas TPC development — 2019 - today

ALICE and ALICE TPC upgrade collaboration

PhD thesis experiment (cf. Education), Development of new readout chambers allowing for continuous readout of the ALICE TPC, on-site ALICE TPC expert, beam-test coordination — 2014 - 2018

Publications

To see a full list of all my publications you may check the inspirehep author search as linked here. In total I have 179 published papers with an h-index of 76. This includes the collaboration papers of the ALICE, DUNE, XENONnT and Darwin collaborations I have worked with in the past or I am still working with today. The list below gives papers and reports with major contributions from my side.

Journal papers

For these publications I am the lead- and corresponding author, the first author is indicated in bold. (In most cases the author list is ordered alphabetically.) I had critical contributions to the development of the measurement, the commissioning of the set-up, the data taking, the analysis, the paper writing, and the organisation of the internal review processes of the publications in this section.

[1] **A. Deisting**. "Commissioning of a hybrid readout TPC test set-up and gas gain simulations", *J. Phys.: Conf. Ser. 2374 012145*; DOI: [10.1088/1742-6596/2374/1/012145], arXiv: [2201.02464];

[2] **A. Deisting**, *et al*. "Commissioning of a High Pressure Time Projection Chamber with Optical Readout", *Instruments 2021, 5(2), 22*; DOI: [10.3390/instruments5020022];

[3] **A. Aguilar-Arevalo**, *et al*. "Dosimetry and Calorimetry Performance of a Scientific CMOS Camera for Environmental Monitoring", *Sensors 2020, 20(20), 5746*; DOI: [10.3390/s20205746], arXiv: [2009.11227];

[4] **A. Deisting**, *et al*. "Secondary discharge studies in single and multi GEM structures", *NIM A, 2019, 937, pp. 168-180*; DOI: [10.1016/j.nima.2019.05.057], arXiv: [1901.06035];

[5] **A. Deisting** for the HPTPC working groups. "Commissioning and beam test of a high pressure time projection chamber", *NIM A, 2020, 958, pp. 162153*; DOI: [10.1016/j.nima.2019.04.107];

[6] **A. Deisting**, C. Garabatos and A. Szabo. "Ion mobility measurements in Ar-CO_2, Ne-CO_2, and Ne-CO_2-N_2 mixtures, and the effect of water contents", *NIM A, 2018, 904, pp. 1-8*; DOI: [10.1016/j.nima.2018.07.008], arXiv: [1804.10288]

[7] **A. Deisting** and C. Garabatos. "Discharge and stability studies for the new readout chambers of the upgraded ALICE TPC", *2017 JINST 12 C05017*; DOI: [10.1088/1748-0221/12/05/C05017], arXiv: [1705.02150];

[8] **A. Deisting**, C. Garabatos, A. Szabo and D. Vranic. "Measurements of ion mobility in argon and neon based gas mixtures", *NIM A, 2017, 845, pp. 215-217* ; DOI: [10.1016/j.nima.2016.06.093], arXiv: [1603.07638];

[9] **A. Deisting** for the ALICE collaboration. "Status of the R&D activities for the upgrade of the ALICE TPC", *EPJ Web Conf. 174 (2018) 01006*; DOI: [10.1051/epjconf/201817401006], arXiv: [1601.02183];

Selected co-authored publications and reports

[10] **A. Dias, M. Alvarez, Y. Gándola, A. Deisting**, *et al.* "PlomBOX: a low cost bioassay for the sensitive detection of lead in drinking water", *Commun Eng 4, 2 (2025)*; DOI: [10.1038/s44172-024-00337-7];
A. Dias and me were lead developers for the PlomApp and database, and I worked with her on the analysis reported in the Results section. I contributed to the writing and editing of the paper. Furthermore, A. Dias was a PhD student I co-supervised and the paper reports much of her work.

[11] **E. Aprile**, *et al.* (**XENON Collaboration**). "First Indication of Solar ^{8}B Neutrinos via Coherent Elastic Neutrino-Nucleus Scattering with XENONnT", *Phys. Rev. Lett. 133, 191002*; DOI: [10.1103/PhysRevLett.133.191002], arXiv: [2408.02877];
Review of some of the analysis for the paper, collaboration reviews of the paper, and detector shifts.

[12] **J. Aalbers**, *et al.* (**XLZD Collaboration**). "The XLZD Design Book: Towards the Next-Generation Liquid Xenon Observatory for Dark Matter and Neutrino Physics", arXiv: [2410.17137];
Small contributions to the writting of the report, discussions within XLZD, and collaboration review of the finsihed publication

[13] **A. Dias, M. Alvarez , Y. Gándola, A. Deisting**, *et al*. "Is there lead in my drinking water? Demonstration of the PlomBOX biosensor platform for low-cost metrology", Submitted to *Nature Communications Earth & Environment*;
Critical contributions to the development of the measurement, the analysis code, the paper writing, and the internal review processes. The lead and corresponding author was a PhD student (A. Dias) whom I co-supervised.

[14] **S. Acharya**, *et al*. "ALICE upgrades during the LHC Long Shutdown 2", *2024 JINST 19 P05062*; DOI: [10.1088/1748-0221/19/05/P05062], arXiv: [2302.01238];
Critical contributions to the ALICE TPC upgrade works reported as part of this paper.

[15] **A. Ritchie-Yates, A. Deisting**, *et al*. "First operation of an ALICE OROC operated in high pressure Ar-CO_2 and Ar-CH_4", *Eur. Phys. J. C 83, 1139 (2023)*; DOI: [10.1140/epjc/s10052-023-12297-x], arXiv: [2305.08822];
Critical contributions to the development of the measurement, the commissioning of the set-up, the data taking, the analysis, the paper writing, and the organisation of the internal review processes. The first and corresponding author is a PhD student (A. Ritchie-Yates) whom I supervised in the laboratory.

[16] **A. Lowe**, *et al*. "ARIADNE$^+$: Large scale demonstration of fast optical readout for dual-phase LArTPCs at the CERN Neutrino Platform" *Phys. Sci. Forum 2023 8(1) 46*; DOI: [10.3390/psf2023008046], arXiv: [2301.02530];
Contributions to the commissioning of the set-up, and the internal review processes.

[17] **A. Aguilar-Arevalo**, *et al*. "Volume reduction of water samples to increase sensitivity for radioassay of lead contamination", *Appl Water Sci 12, 151 (2022)*; DOI: [10.1007/s13201-022-01669-5], arXiv: [2205.04147];
Critical contributions to the development of the measurement, and the internal review processes. The lead and corresponding author is a PhD student (A. Dias) whom I co-supervised.

[18] **The DUNE collaboration**. "A Gaseous Argon-Based Near Detector to Enhance the Physics Capabilities of DUNE", *2022 Snowmass Summer Study*; arXiv: [2203.06281];
Contributions to the planning discussions for the report and the internal review processes.

[19] **A. Aguilar-Arevalo**, *et al*. "PlomBOX – development of a low-cost CMOS device for environmental monitoring", *Contribution to CEST 2021*; arXiv: [2201.03348];
Co-coordinator of the research effort, critical contributions to the development of the methodology, the analysis framework and the internal review processes. The lead and corresponding author is a PhD student (A. Dias) whom I co-supervised.

[20] **J. Adolfsson**, *et al*. "The upgrade of the ALICE TPC with GEMs and continuous readout", *2021 JINST 16 P03022*; DOI: [10.1088/1748-0221/16/03/p03022], arXiv: [2012.09518];
Critical contributions to the development of some of the measurements within (and the corresponding commissioning of small scale set-ups, data taking, and analysis) as well as the organisation of beam times. Contributions to the general reported hardware development and the internal review processes.

[21] **S. B. Jones**, *et al*. "Off-Axis Characterisation of the CERN T10 Beam for low Momentum Proton Measurements with a High Pressure Gas Time Projection Chamber", *Instruments 2020, 4(3), 21*; DOI: [10.3390/instruments4030021], arXiv: [2007.15609];
Critical contributions to the detector commissioning, the data taking, the development of the analysis framework and the internal review process

[22] **A. Deisting**. "Towards a low cost lead assay technique for drinking water using CMOS sensors", *2019 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) pp. 1-2*; DOI: [10.1109/NSS/MIC42101.2019.9059987]; arXiv: [2001.01777];
I am the main and corresponding author of this conference paper and my contributions to the development of the measurement, the commissioning of the set-up, the data taking, and the data analysis were critical.

[23] **A. V. Waldron**, A. Deisting. "A High Pressure TPC with Optical Readout", *2019 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) pp. 1-2*; DOI: [10.1109/NSS/MIC42101.2019.9059848];
Critical contributions to the development of the measurement, the commissioning of the set-up, the data taking, the analysis, and the internal review processes.

[24] **A. Mathis** for the ALICE TPC Upgrade collaboration. "Particle identification studies with a full-size 4-GEM prototype for the ALICE TPC upgrade", *NIM A, 2018, 903 pp. 215-223*; DOI: [10.1016/j.nima.2018.06.084], arXiv: [1805.03234];
Critical contributions to the organisation of the test beam and the data taking. Contributions to the planning discussions and the internal review process.

[25] **The ALICE Collaboration**. "Addendum to the Technical Design Report for the Upgrade of the ALICE Time Projection Chamber", *ALICE-TDR-016-ADD-1*; CDS: [CERN-LHCC-2015-002]
Critical contributions to the organisation of the test beams, the data taking, smaller experiments in the lab as well as the data analysis for test-beams and small prototypes.

Talks, seminars and posters

Conference talk "Tests of wire electrodes with the Mainz high resolution scanning set-up", *DPG-Frühjahrstagung* (2024), [Book of abstracts]

Invited talk "Lessons learned from current gas TPCs", *DUNE Near Detector Phase II workshop* (2023), [Indico]

Conference talk "A high resolution scanning set-up for defect detection on electrodes" , *XeSAT2023* (2023), [Indico]

Conference talk "A high resolution scanning set-up for defect detection on electrodes", *DPG-Frühjahrstagung SMuK* (2023), [Book of abstracts]

Conference talk "Optical TPC: current and future developments", *New Horizons in Time Projection Chambers* (2020), [Indico]

Conference talk "Commissioning and beam test of a high pressure time projection chamber", *15th Vienna conference on Instrumentation* (2019), [Indico]

Invited talk "Secondary discharge phenomena in GEM detectors", Overview talk for the ALICE TPC Upgrade Collaboration, *MPGD stability work-shop* (2018), [Indico]

Group report "Towards the mass production of readout chambers for the upgrade of the ALICE TPC", *DPG-Frühjahrestagung, Hadronen und Kerne* (2017), [Book of abstracts]

Conference talk "Discharge and stability studies for the readout chambers of the upgraded ALICE TPC", *International Conference on Instrumentation for Colliding Beam Physics (INSTR17)* (2017), [Indico]

Conference talk "Measurements of ion mobility in argon- and neon-based gas mixtures", *DPG-Frühjahrestagung, Hadronen und Kerne* (2016), [Book of abstracts]

Conference talk "Status of the R&D activities for the upgrade of the ALICE TPC" *MPGD – 4th Conference on Micro-Pattern Gaseous Detectors* (2015), [Indico]

Conference talk "Untersuchung des induzierten Ionen-Signales bei Gasverstärkung von Elektronen mit Hilfe eines InGrid", *DPG-Frühjahrestagung, Teilchenphysik* (2014), [Book of abstracts]

Seminar "Towards the next xenon filled dark matter experiment", *EMMI Nuclear and Quark Matter Seminar (2023)*

Seminar "A gas TPC for neutrino physics", *ETAP Seminar at University of Mainz* (2022)

Seminar "Under pressure: A Time Projection Chamber for neutrino interaction measurements", *High energy physics seminar at Technische Universität München* (2019), Munich (DE)

Seminar "The ALICE Time Projection Chamber and its upgrade" *Particle Physics Seminar at Imperial College London* (2019)

Seminar "Taking a Time Projection Chamber to high pressure" *High energy physics seminar at the University College London* (2018)

Seminar "The ALICE Time Projection Chamber and its upgrade" *Particle Physics Seminar at the Royal Holloway University London* (2018)

Poster "The DARWIN experiment and the development of assay techniques for large electrodes" *16th Pisa Meeting on Advanced Detectors* (2024), [Conference web page]

Poster "A hybrid high pressure time projection chamber for neutrino experiments", *TIPP 2021 International Conference on Technology and Instrumentation in Particle Physics* (2021), [Indico]

Poster "Towards a low cost lead assay technique for drinking water using CMOS sensors" *2019 IEEE Nuclear Science Symposium and Medical Imaging Conference* (2019), [Conference web page]

Poster "Measurement of ion mobility in Argon and Neon based gas mixtures", *14th Vienna conference on Instrumentation* (2016), [Indico]

Talk "Electrodes status" *XENONnT collaboration meeting, Paris* (2023)

Talk "Mainz Optical Scan Facility" *XENONnT collaboration meeting, L'Aquila* (2023)

Talk "OROC test stand and testing at RHUL & Imperial College London", *6th DUNE near detector workshop* (2019), [Indico]

Talk "Progress on outer Readout chamber testing at Royal Holloway, Universtiy of London & Imperial College London", *DUNE collobarion meeting* (2020)

Talk "Discharge studies with single GEMs" *RD51 mini week* (2016)

Talk "Measurements of ion mobility in argon- and neon-based gas mixtures", *RD51 collaboration meeting* (2016)

Talk "Discharge studies with an inner readout chamber prototype", *DPG-Frühjahrestagung, Hadronen und Kerne* (2015), [Book of abstracts]

Talk "ALICE setup in H4: Stability measurement of readout chamber prototype for the ALICE TPC", *RD51 mini week* (2014)

Talk "Status of the ALICE TPC upgrade and beam-time prospects", *14th RD51 collaboration meeting* (2014)

Supervised students

The following list shows all Bachelor (3 to 6 months), Master (one year) and doctoral (3.5 years+) students I have supervised druing their research work. In addition I list "Summer placements", students I supervised during their ∼6 weeks internship in our research group. "Lab supervisor" refers to students who I was not the official supervisor of, but who I supervised during the bulk of their research work. Abbreviations: JGU – Johannes Gutenberg-Universität Mainz (DE), Royal Holloway, University of London (GB) – RHUL, University of Heidelberg (DE) – HD.

Constantin Szyszka, Master of Science (Lab Supervisor) *JGU*
Recommissioning of the MainzTPC and first Liquid Xenon Observation using Commercially Available Cameras 2023 - 2024

Shumit Arumoy Mitra, Bachelor of Science (Lab Supervisor) *JGU*
Corona Discharge as a Tool for Identifying Thin Wire Surface Irregularities 2022 - 2023

Adriana Dias, PhD (Co-supervisor) *RHUL*
Detector Development for Particle Physics and Applications to Environmental Monitoring (preliminary) 2019 - 2022

Ash Ritchie-Yates, PhD (Lab supervisor) *RHUL*
Development of readout structures for high pressure gas time projection chambers (preliminary) 2019 - 2022

Joshua Eeles, Master by Research (Supervisor) *RHUL*
Commissioning and Operating an OROC based High Pressure Time Projection Chamber 2020 - 2021

Asim Aslam, Summer placement (Supervisor) *RHUL*
A gaseous proportional counter built from a conventional aluminium beverage can (Essentially doing this: arXiv:1509.02379) 2021

Annora Sundararajan, Bachelor of Science (Supervisor) *RHUL*
Commissioning of a Camera System for the Optical Readout of a Time Projection Chamber 2019 - 2020

Adam Tarrant, Master by Research (Supervisor) *RHUL*

Development of Gas Electron Multipliers for hybrid-readout gaseous Time Projection Chambers in Future Neutrino Experiments 2019 - 2020

Matthew Loxton, Bachelor of Science (Supervisor) *RHUL*

Simulation of Electroluminescence in Nobel Gases at Different Pressures for Gaseous Detectors with Optical Read-out 2018 - 2019

Bogdan Mihail Blidaru, Master of Science (Lab supervisor) *HD*

Discharge propagation in double-GEM detectors 2017 – 2018

Alexandra Datz, Bachelor of Science (Lab supervisor) *HD*

Studies on Secondary Discharges and their Mitigation with a two GEM Detector 2016 – 2017

Lecture course contributions and teaching assistant roles

Astroparticle Physics *JGU*

Masters course, contributing lectures as substitute 2023

Particle detectors *JGU*

Masters course, contributing lectures as substitute 2022

PH1920: Physics of the Universe *RHUL*

Contributing all the astrophysics and cosmology lectures and exercises 2022

PH3170/4170: C++ and Object Oriented Programming *RHUL*

Contributing one lecture and supervising a third of the students on their final coding projects 2021

PH1920: Physics of the Universe *RHUL*

Contributing one astrophysics lecture and the corresponding exercises 2021

PH3170/4170: C++ and Object Oriented Programming *RHUL*

Contributing one lecture and supervising a third of the students on their final coding projects 2020

PH1920: Physics of the Universe *RHUL*

Contributing one astrophysics lecture and the corresponding exercises 2020

PH1920: Physics of the Universe *RHUL*

Contributing one astrophysics lecture and the corresponding exercises 2019

Volunteer Services

In addition to the information listed above I was part of a group of early career researches working on a code-of-conduct for the excellence cluster and I am now serving as a member of the Ombudsteam.

I organise the journal club of the XENON/COSI group in Mainz, I review articles for JINST, NIM A, MDPI instruments and sensors and EPJC. In the past, I organised the seminars of the high energy physics group at Royal Holloway, University of London, from 2019 to 2022.

Outreach

Below a list of my outreach activities. In addition I do regular lab tours for undergraduate students and pupils in our laboratories here in Mainz. I occasionally showed visitors of the general public the ALICE experiment during my time at CERN. During my undergraduate at University of Bonn I participated in the "Physik show" (`https://www.physikshow.uni-bonn.de/`).

Mainzer Wissenschaftsmarkt *JGU*

Particle physics outreach to the general public in the city centre of Mainz 2023 - 2024

Pupils workshops on PMT operation *JGU*

Measurements of Cherenkov radiation of a PMT immersed in water, simple data analysis with python 2022 - 2024

Outreach talk to pupils *JGU*

"Dunkle Materie & das XENONnT Experiment" ("Dark Matter and the XENONnT experiment"), International Cosmic Day 2022

Englefield Green Community Hub: "Holloway Hour' *RHUL*

Presenting our research – together with two PhD students – to the local community in Englefield Green 2022

Girls into Physics *RHUL*

Lecture on detector development, Outreach event to inspire schoolkids to study physics after school. 2021