

Exponent®
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Stephane Zsoldos, Ph.D.

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Professional Profile

Dr. Zsoldos specializes in building data-driven applications using physics-based machine learning, computer vision, and advanced data analytics. With expertise spanning scalable data architectures, data cleaning, statistical analysis, and dashboard creation, he effectively transforms complex datasets into actionable insights. He integrates state-of-the-art AI techniques with physics-driven methods across industries including mining, finance, and radiation safety. In mining, Dr. Zsoldos developed geological mapping solutions utilizing deep learning and remote muon imaging via raytracing to precisely identify geological features such as shafts and mineral density variations. In finance, his quantum-inspired modeling accurately quantifies volatility risks surrounding market events, aiding informed investment decisions. On the experimental and hardware side, Dr. Zsoldos has significant experience in radiation and nuclear physics, including precision dosimetry, shielding design, ionizing medical devices, and Monte Carlo simulations of radiation-material interactions. He also provides rigorous optical device characterization supported by computational modeling and precise measurements, consistently delivering impactful solutions tailored to client needs.

Dr. Zsoldos was a Marie Curie Fellow in Particle Physics at King's College London and the Kavli Institute for Physics and Mathematics of the Universe at the University of Tokyo. His doctoral research focused on detecting and characterizing cosmic-ray muons in large neutrino detectors located deep underground. He has extensive programming experience in multiple languages including C/C++, Fortran, Python, R, Julia, Java, Kotlin, Go, JavaScript, and Matlab, as well as expertise with ML frameworks such as TensorFlow, PyTorch, and JAX, and Bayesian analysis frameworks including Stan, PyMC, and TensorFlow Probability.

Academic Credentials & Professional Honors

Ph.D., Subatomic & Astroparticles Physics, Universite Grenoble Alpes, 2016

M.S., Quantum Fields & Fundamental Forces, Imperial College London, UK, 2013

M.Eng., Fundamental Physics and Nanoscience, Grenoble INP Phelma, 2013

ICRR Inter-University Research Program

Kashiwa (University of Tokyo, Kavli IPMU (Japan)

Hyper-Kamiokande OD PMTs QA, ¥450 000,00, and ¥100 000,00 for 2022

Marie Skłodowska-Curie Fellowship

King's College of London (UK) / University of Tokyo, Kavli IPMU (Japan)

EUR279 228,48

Academic Appointments

Marie Skłodowska-Curie Fellowship

King's College of London (UK) / University of Tokyo, Kavli IPMU (Japan)

Prior Experience

Marie Curie Fellow, King's College London and the University of Tokyo, 2021-2024

Postdoctoral Research Scholar, UC Berkeley, 2019-2021

Postdoctoral Research Associate, King's College London, 2016-2019

Professional Affiliations

American Physical Society, Member

Institute of Physics, Member

Publications

S. Zsoldos et al. [T2K] "Constraint on the matter–antimatter symmetry-violating phase in neutrino oscillations," Nature 580, no.7803, 339-344 (2020)

S. Zsoldos et al. [T2K], "Search for CP Violation in Neutrino and Antineutrino Oscillations by the T2K Experiment with 2.2 × 1021 Protons on Target," Phys. Rev. Lett. 121, no.17, 171802 (2018)

S. Zsoldos et al. [Hyper-Kamiokande], "Physics potentials with the second Hyper-Kamiokande detector in Korea," PTEP 2018, no.6, 063C01 (2018)

S. Zsoldos et al. [T2K], "Improved constraints on neutrino mixing from the T2K experiment with 3.13 × 1021 protons on target," Phys. Rev. D 103, no.11, 112008 (2021)

S. Zsoldos, Z. Bagdasarian, G. D. Gann Orebi, A. Barna and S. Dye, "Geo- and reactor antineutrino sensitivity at THEIA," Eur. Phys. J. C 82, no.12, 1151 (2022)

S. Zsoldos et al. [Super-Kamiokande], "Search for proton decay via p → e+π0 and p → μ+π0 with an enlarged fiducial volume in Super-Kamiokande I-IV," Phys. Rev. D 102, no.11, 112011 (2020)

S. Zsoldos et al. [T2K], "Search for heavy neutrinos with the T2K near detector ND280," Phys. Rev. D 100, no.5, 052006 (2019)

S. Zsoldos et al. [STEREO],"Sterile Neutrino Constraints from the STEREO Experiment with 66 Days of Reactor-On Data," Phys. Rev. Lett. 121, no.16, 161801 (2018)

S. Zsoldos et al. [T2K], "Characterization of nuclear effects in muon-neutrino scattering on hydrocarbon with a measurement of final-state kinematics and correlations in charged-current pionless interactions at T2K," Phys. Rev. D 98, no.3, 032003 (2018)

S. Zsoldos et al. [T2K], "Measurements of neutrino oscillation parameters from the T2K experiment using

3.6 × 1021 protons on target," Eur. Phys. J. C 83, no.9, 782 (2023)

S. Zsoldos et al. [Super-Kamiokande], "Diffuse supernova neutrino background search at Super-Kamiokande," Phys. Rev. D 104, no.12, 122002 (2021)

S. Zsoldos et al. [Hyper-Kamiokande], "Supernova Model Discrimination with Hyper-Kamiokande," Astrophys. J. 916, no.1, 15 (2021)

S. Zsoldos et al. [T2K], "Simultaneous measurement of the muon neutrino charged- current cross section on oxygen and carbon without pions in the final state at T2K," Phys. Rev. D 101, no.11, 112004 (2020)

S. Zsoldos et al. [T2K], "Search for light sterile neutrinos with the T2K far detector Super-Kamiokande at a baseline of 295 km,", Phys. Rev. D 99, no.7, 071103 (2019)

S. Zsoldos et al. [STEREO], "The STEREO Experiment," JINST 13, no.07, P07009 (2018)

S. Zsoldos et al. [Super-Kamiokande], "Search for Astrophysical Electron Antineutrinos in Super-Kamiokande with 0.01% Gadolinium-loaded Water," Astrophys. J. Lett. 951, no.2, L27 (2023)

S. Zsoldos et al. [Super-Kamiokande], "Search for Cosmic-Ray Boosted Sub-GeV Dark Matter Using Recoil Protons at Super-Kamiokande," Phys. Rev. Lett. 130, no.3, 031802 (2023)

S. Zsoldos et al. [Super-Kamiokande], "Search for proton decay via p → μ+K0 in 0.37 megaton-years exposure of Super-Kamiokande," Phys. Rev. D 106, no.7, 072003 (2022)

S. Zsoldos et al. [Super-Kamiokande], "Search for neutrinos in coincidence with gravitational wave events from the LIGO-Virgo O3a Observing Run with the Super-Kamiokande detector," Astrophys. J. 918, no.2, 78 (2021)

S. Zsoldos et al. [T2K], "First T2K measurement of transverse kinematic imbalance in the muon-neutrino charged-current single-π+ production channel containing at least one proton," Phys. Rev. D 103, no.11, 112009 (2021)

S. Zsoldos et al. [Super-Kamiokande], "Neutron-antineutron oscillation search using a 0.37 megaton-years exposure of Super-Kamiokande," Phys. Rev. D 103, no.1, 012008 (2021)

S. Zsoldos et al. [T2K], "T2K measurements of muon neutrino and antineutrino disappearance using 3.13 × 1021 protons on target," Phys. Rev. D 103, no.1, L011101 (2021)

S. Zsoldos et al. [Super-Kamiokande], "Indirect search for dark matter from the Galactic Center and halo with the Super Kamiokande detector," Phys. Rev. D 102, no.7, 072002 (2020)

S. Zsoldos et al. [T2K], "Measurements of νμ and νμ + νμ charged-current cross-sections without detected pions or protons on water and hydrocarbon at a mean anti-neutrino energy of 0.86 GeV," PTEP 2021, no.4, 043C01 (2021)

S. Zsoldos et al. [T2K], "Measurement of the charged-current electron (anti-) neutrino inclusive cross-sections at the T2K off-axis near detector ND280," JHEP 10, 114 (2020)

S. Zsoldos et al. [T2K], "First combined measurement of the muon neutrino and antineutrino charged-current cross section without pions in the final state at T2K," Phys. Rev. D 101, no.11, 112001 (2020)

S. Zsoldos et al. [Super-Kamiokande], "Search for proton decay into three charged leptons in 0.37 megaton-years exposure of the Super-Kamiokande," Phys. Rev. D 101, no.5, 052011 (2020)

S. Zsoldos et al. [T2K], "Search for Electron Antineutrino Appearance in a Long-baseline Muon

Antineutrino Beam," Phys. Rev. Lett. 124, no.16, 161802 (2020)

S. Zsoldos et al. [T2K], "Measurement of neutrino and antineutrino neutral-current quasielasticlike interactions on oxygen by detecting nuclear deexcitation γ rays," Phys. Rev. D 100, no.11, 112009 (2019)

S. Zsoldos et al. [T2K], "Measurement of the muon neutrino charged-current single π+ production on hydrocarbon using the T2K off-axis near detector ND280," Phys. Rev. D 101, no.1, 012007 (2020)

S. Zsoldos et al. [T2K], "First measurement of the charged current νμ double differential cross section on a water target without pions in the final state," Phys. Rev. D 102, no.1, 012007 (2020)

S. Zsoldos et al. [Super-Kamiokande], "Sensitivity of Super-Kamiokande with Gadolinium to Low Energy Anti-neutrinos from Pre-supernova Emission," Astrophys. J. 885, 133 (2019)

S. Zsoldos et al. [T2K], "Measurement of the νμ charged-current cross sections on water, hydrocarbon, iron, and their ratios with the T2K on-axis detectors," PTEP 2019, no.9, 093C02 (2019)

S. Zsoldos et al. [T2K], "Search for neutral-current induced single photon production at the ND280 near detector in T2K," J. Phys. G 46, no.8, 08LT01 (2019)

S. Zsoldos et al. [Super-Kamiokande], "Measurement of the neutrino-oxygen neutral- current quasielastic cross section using atmospheric neutrinos in the SK-Gd experiment," Phys. Rev. D 109, no.1, L011101 (2024)

S. Zsoldos et al. [T2K], "Measurements of the νμ and $\bar{\nu}$μ-induced coherent charged pion production cross sections on C12 by the T2K experiment," Phys. Rev. D 108, no.9, 9 (2023)

S. Zsoldos et al. [T2K], "Updated T2K measurements of muon neutrino and antineutrino disappearance using 3.6×1021 protons on target," Phys. Rev. D 108, no.7, 072011 (2023)

S. Zsoldos et al. [T2K], "First measurement of muon neutrino charged-current interactions on hydrocarbon without pions in the final state using multiple detectors with correlated energy spectra at T2K," Phys. Rev. D 108, no.11, 112009 (2023)

S. Zsoldos et al. [Super-Kamiokande], "Measurement of the cosmogenic neutron yield in Super-Kamiokande with gadolinium loaded water," Phys. Rev. D 107, no.9, 092009 (2023)

S. Zsoldos et al. [Super-Kamiokande], "Neutron tagging following atmospheric neutrino events in a water Cherenkov detector," JINST 17, no.10, P10029 (2022)

S. Zsoldos et al. [T2K], "Scintillator ageing of the T2K near detectors from 2010 to 2021," JINST 17, no.10, P10028 (2022)

S. Zsoldos et al. [Super-Kamiokande], "Searching for Supernova Bursts in Super-Kamiokande IV," Astrophys. J. 938, no.1, 35 (2022)

S. Zsoldos et al. [Super-Kamiokande], "Pre-supernova Alert System for Super-Kamiokande," Astrophys. J. 935, no.1, 40 (2022)

S. Zsoldos et al. [Super-Kamiokande], "Search for tens of MeV neutrinos associated with gamma-ray bursts in Super-Kamiokande," PTEP 2021, no.10, 103F01 (2021)

S. Zsoldos et al. [Super-Kamiokande], "Search for Astronomical Neutrinos from Blazar TXS 0506+056 in Super-Kamiokande," Astrophys. J. Lett. 887, no.1, L6 (2019)

S. Zsoldos et al. [Super-Kamiokande], "Search for solar electron anti-neutrinos due to spin-flavor

precession in the Sun with Super-Kamiokande-IV," Astropart. Phys. 139, 102702 (2022)

S. Zsoldos et al. [Super-Kamiokande], "Search for proton decay via p → e+π0 and p → μ+π0 with an enlarged fiducial volume in Super-Kamiokande I-IV," Phys. Rev. D 102, no.11, 112011 (2020)

S. Zsoldos et al., "THEIA: an advanced optical neutrino detector," Eur. Phys. J. C 80, no.5, 416 (2020)

S. Zsoldos et al. "Trigger and readout electronics for the STEREO experiment," JINST 11, no.02, C02078 (2016)

Presentations

Implicit representation modeling neutrino event topologies in water-Cherenkov detectors Kashiwa, Japan ICRR Inter University Workshop 2024

Implicit representation modeling neutrino event topologies in water-Cherenkov detectors Rabat (Morocco) African Conference on High Energy Physics (ACHEP 2023)

Betting to reconstruct Cherenkov rings in large neutrino detectors Kyoto (Japan) International Conference on the Physics of the Two Infinities

A bottom-up approach for neutrino water-Cherenkov detector systematic uncertainties, from calibration to analysis Cape Town (South Africa) 28th International Nuclear Physics Conference (INPC 2022)

Status of the Hyper-K experiment Hanoi (Vietnam) Vietnam Flavour Physics Conference 2022

The Outer Detector system for the Hyper-Kamiokande experiment Prague (Czech Republic) 40th International Conference on High Energy Physics (ICHEP2020)

The Hyper-Kamiokande Outer Detector Toyama (Japan) 16th International Conference on Topics in Astroparticle and Underground Physics (TAUP2019)

Large Area Photo-Detection System using 3" PMTs for the Hyper-Kamiokande Outer Detector Tokyo (Japan) V International Workshop on New Photon-Detectors (PD18)

Status on Hyper-K outer-detector simulation studies Naples (Italy) Workshop on New and Enhanced Photosensor Technologies for Underground/underwater Neutrino Experiments (NEPTUNE)

Oscillation and Cross-section Results from T2K Yamagata (Japan) XIV International Conference on Heavy Quarks and Leptons 2018 (HQL2018)

Status on Hyper-K outer-detector simulation studies East Lansing, MI (USA) Workshop on mPMT development for IWCD and Hyper-K

Performance estimation and potential of the Hyper-K detector Busan (South Korea) 35th International Cosmic Ray Conference (ICRC2017)

Status of the STEREO experiment Chicago, IL (USA) 38th International Conference on High Energy Physics (ICHEP2016)