Luigi Pertoldi — ACADEMIC RESUME

https://gipert.github.io

TU München, Physik Dep.
Lehrstuhl für Experimentelle Astroteilchenphysik | E15
James-Franck-Str. 1, 85748 Garching
luigi.pertoldi@tum.de | pertoldi@pd.infn.it

Education

- **Università degli Studi di Padova, INFN Sezione di Padova** — Padova, Italy
  Ph.D. in Physics, cum laude — *Oct 2017 – Sep 2020*
- **Università degli Studi di Padova** — Padova, Italy
  Master of Physics. 110/110 cum laude — *Oct 2015 – Jul 2017*
- **Università degli Studi di Padova** — Padova, Italy
  Bachelor of Physics. 104/110 — *Oct 2012 – Sep 2015*

Research Activity

- **TU München & INFN Padova • GERDA/LEGEND Collaborations** — München, DE
  Post-doctoral researcher at TUM & Associated visitor at INFN Padova — *Nov 2020 – Present*
  - **LEGEND-200 background modeling [team leader]** — Development of a background model based on LEGEND-200 physics data to identify the location of background sources and compare intensities with expectations.
  - **LEGEND-1000 background modeling** — Development and validation of the LEGEND-1000 background model for the DOE project proposal [7].
  - **LEGEND-200 optical response** — Development and validation of a model for the generation, propagation and detection of optical photons in the LEGEND-200 experiment, based on calibration data.
  - **LEGEND-200 analysis software stack [core developer and manager]** — Development and management of the primary LEGEND Python software stack for offline data analysis. Low-level data-objects, data compression, metadata management system, implementation of modern software development practices and tools.
  - **LEGEND simulation software stack [core developer and manager]** — Development of a new software stack for LEGEND-related background simulations based on modern Geant4 and Python tools for implementing experimental geometries. Development of the `pyg4ometry`[1] package. R&D of a fast optical physics simulation package for the argon instrumentation system.
  - **HPGe detector characterization** — Modeling and *in-situ* characterization of the GERDA HPGe detectors active volume with low-energy ^{39}Ar events recorded by the experiment.
- **University of Padova & INFN Padova • GERDA/LEGEND Collaborations** — Padova, IT
  Ph.D. student, GERDA simulations & background studies co-coordinator — *Oct 2017 – Oct 2020*
  - **$2\nu\beta\beta$ half-life precision measurement and new $\beta\beta$ physics searches** — Development of the statistical tools used to constrain the presence of new physics phenomena on top of the $2\nu\beta\beta$ decay spectrum [6]. Development of a precision analysis of the $2\nu\beta\beta$ decay spectrum and extraction of the experimental half-life [1].
  - **Background modeling** — Extraction of expectations for signal and background event distributions in GERDA by means of Monte Carlo simulations. The results are a key ingredient for many physics analyses. Development of the background model of the experiment [12].
  - **Liquid argon detector modeling** — Development of the Monte Carlo simulation software module responsible for generating and propagating liquid argon scintillation light in the GERDA setup. Development of a predictive model of the GERDA argon veto system [2], tuned on calibration data, employed for sensitive new-physics searches.

[1] S.D. Walker, A. Abramov, L.J. Nevay, W. Shields, S.T. Boogert, "pyg4ometry: A Python library for the creation of Monte Carlo radiation transport physical geometries", Computer Physics Communications 272 108228 (2022). Website: `https://pyg4ometry.readthedocs.io`

- **The MaGe simulation toolkit** — Development of MaGe, a Geant4-based software framework to simulate background and signal events in various ββ-decay-related experimental setups, including GERDA, Majorana and LEGEND.
- **HPGe detector modeling and characterization** — Development of the data acquisition software suite used in the characterization campaign of the new inverted-coaxial germanium detectors used in LEGEND.

Publications

[1] M. Agostini et al. "Final Results of GERDA on the Two-Neutrino Double-β Decay Half-Life of ^{76}Ge". *Accepted for publication on Phys. Rev. Lett.* (2023). arXiv: 2308.09795 [nucl-ex]

[2] M. Agostini et al. "Liquid argon light collection and veto modeling in GERDA Phase II". *Eur. Phys. J. C* 83.4 (2023), p. 319. DOI: 10.1140/epjc/s10052-023-11354-9. arXiv: 2212.02856 [physics.ins-det]

[3] M. Agostini et al. "Search for tri-nucleon decays of ^{76}Ge in GERDA". *Eur. Phys. J. C* 83.9 (2023), p. 778. DOI: 10.1140/epjc/s10052-023-11862-8. arXiv: 2307.16542 [nucl-ex]

[4] C. Adams et al. "Neutrinoless Double Beta Decay" (2022). arXiv: 2212.11099 [nucl-ex]

[5] M. Agostini et al. "Pulse shape analysis in GERDA Phase II". *Eur. Phys. J. C* 82.4 (2022), p. 284. DOI: 10.1140/epjc/s10052-022-10163-w. arXiv: 2202.13355 [physics.ins-det]

[6] M. Agostini et al. "Search for exotic physics in double-β decays with GERDA Phase II". *JCAP* 12 (2022), p. 012. DOI: 10.1088/1475-7516/2022/12/012. arXiv: 2209.01671 [nucl-ex]

[7] N. Abgrall et al. "The Large Enriched Germanium Experiment for Neutrinoless $\beta\beta$ Decay: LEGEND-1000 Preconceptual Design Report" (2021). arXiv: 2107.11462 [physics.ins-det]

[8] M. Agostini et al. "Calibration of the GERDA experiment". *Eur. Phys. J. C* 81.8 (2021), p. 682. DOI: 10.1140/epjc/s10052-021-09403-2. arXiv: 2103.13777 [physics.ins-det]

[9] M. Agostini et al. "Characterization of inverted coaxial ^{76}Ge detectors in GERDA for future double-β decay experiments". *Eur. Phys. J. C* 81 (2021), p. 505. DOI: 10.1140/epjc/s10052-021-09184-8. arXiv: 2103.15111 [physics.ins-det]

[10] M. Neuberger et al. "The cosmic muon-induced background for the LEGEND-1000 alternative site at LNGS". *J. Phys. Conf. Ser.* 2156.1 (2021), p. 012216. DOI: 10.1088/1742-6596/2156/1/012216

[11] M. Agostini et al. "Final Results of GERDA on the Search for Neutrinoless Double-β Decay". *Phys. Rev. Lett.* 125.25 (2020), p. 252502. DOI: 10.1103/PhysRevLett.125.252502. arXiv: 2009.06079 [nucl-ex]

[12] M. Agostini et al. "Modeling of GERDA Phase II data". *JHEP* 03 (2020), p. 139. DOI: 10.1007/JHEP03(2020)139. arXiv: 1909.02522 [nucl-ex]

[13] M. Agostini et al. "The first search for bosonic super-WIMPs with masses up to 1 MeV/c^2 with GERDA". *Phys. Rev. Lett.* 125.1 (2020), p. 011801. DOI: 10.1103/PhysRevLett.125.011801. arXiv: 2005.14184 [hep-ex]

[14] M. Agostini et al. "Probing Majorana neutrinos with double-β decay". *Science* 365 (2019), p. 1445. DOI: 10.1126/science.aav8613. arXiv: 1909.02726 [hep-ex]

[15] M. Agostini et al. "GERDA results and the future perspectives for the neutrinoless double beta decay search using ^{76}Ge". *Int. J. Mod. Phys. A* 33.09 (2018), p. 1843004. DOI: 10.1142/S0217751X18430042

[16] M. Agostini et al. "Improved Limit on Neutrinoless Double-β Decay of ^{76}Ge from GERDA Phase II". *Phys. Rev. Lett.* 120.13 (2018), p. 132503. DOI: 10.1103/PhysRevLett.120.132503. arXiv: 1803.11100 [nucl-ex]

Links

- Personal portfolio — gipert.github.io
- ORCID ID — orcid.org/0000-0002-0467-2571
- INSPIRE-HEP — inspirehep.net/authors/1667599

- Scopus ID — 57201449246

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