
Matteo De Gerone

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Personal data

- Place and date of birth: ~~XXXXXXXXXXXX~~, Genova, Italy.
- Citizenship: Italian.
- Mother tongue: italian.
- Other languages: english.

Education and professional career

- 03/2017 - now, **Researcher (III Professional level)** at the National Institute of Nuclear Physics (Istituto Nazionale di Fisica Nucleare - INFN), Genoa Division.
- 07/2016 - 03/2017, **Temporary Researcher (RTDA)** at Genoa University.
- 11/2015 - 03/2016, **Term contract worker (Co. Co. Co. Art. 2222)** funded by INFN for MEG Engineering Run.
- 10/2013 - 10/2015, **Research grant** funded by INFN at the at the National Institute of Nuclear Physics (Istituto Nazionale di Fisica Nucleare - INFN), Genoa Division for the research project: "Time of flight detectors for the MEG experiment".
- 06/2012 - 06/2013, **Post Doc Fellowship** at Paul Scherrer Institute, Villigen (CH).
- 05/2011 - 06/2012, **Research Grant** at Rome University "La Sapienza" for the research project: "Search for lepton flavor violation in the $\mu \rightarrow e\gamma$ ' decay'.
- 01/2008 - 12/2010: **PhD degree in Physics, Genoa University.**
Discussion of the thesis: "Searching for the rare muon decay $\mu \rightarrow e + \gamma$: the problem of the high resolution measurement of positron timing".
Advisors: Prof. Flavio Gatti, Prof. William Molzon.
- 2007: **Master degree in Physics, Genoa University.**
Discussion of the thesis: "Sviluppo del rivelatore a fibre scintillanti per l'esperimento MEG" (in italian).
Advisor: Prof. Flavio Gatti
Graduation grade: 108/110

Research activity

My research activity started with my master degree thesis in the context of the MEG experiment. In my thesis work, I dealt with the development of a fiber-scintillating and Avalanche Photodiode based detector. I carried on my activity during my PhD thesis, working on the development, the characterization and the calibration of the Timing Counter detector (TC). The TC is made by 2 arrays of scintillating bars read out on each side by a couple of photomultiplier tubes. The purpose of the detector is a high resolution measurement (~ 60 ps) of the positron time of flight in the $\mu \rightarrow e + \gamma$ decay. In particular, I developed a calibration algorithm which allowed to considerably reduce the time walk contribution to the overall time resolution, thus substantially improving the detector performances.

Since 2009 I have been appointed Detector Expert for the TC detector, with specific responsibility for the calibration and the operations of the detector during all the MEG physic runs (2009 - 2013). Moreover, I contributed to the physic runs also as shift coordinator (2011 - 2013).

The MEG experiment completed data taking in 2013 improving the upper limit on the $\mu \rightarrow e + \gamma$ decay down to 4.2×10^{-13} . I contributed to the global analysis by studying the time difference of the positron and gamma times of flight.

Since 2013, an intensive R&D work has been carried on in order to improve the detector experimental sensitivity. Especially, the TC detector has been completely re-designed with a new layout based on small (~ 100 cm²) scintillating tiles ("pixels") coupled to Silicon Photomultiplier arrays in series connection. I was co-responsible (together with colleagues from Tokyo University) for the new detector development and commissioning. I designed, assembled and characterized many detector prototypes, which were tested in frameworks similar to the experimental one during several beam tests (at the Beam Test Facility in Frascati in 2013 - 2014 and at the Paul Scherrer Institute in 2013-2016). The Timing counter commissioning has been completed in 2016 and the detector is now ready to take data for the MEG II experiment. Since July 2016, I was appointed as local responsible for the Genoa INFN group. Since May 2019, I was appointed as Italian Responsible for the Timing Counter detector.

Thanks to the experience gained in high resolution timing measurement field I have been appointed as Referee for the TOTEM (TOTAl cross section, Elastic scattering and diffraction dissociation Measurement at the LHC) experiment for the 1st INFN Scientific Committee. TOTEM's physics program is dedicated to the precise measurement of the proton-proton interaction cross section, as well as to the in-depth study of the proton structure. In particular, TOTEM colleagues were working on a diamond based timing detector developed for the high resolution time measurement of the extreme high energy proton (expected time resolution is ~ 50 ps).

Since February 2014 my research activity has been also extended to the measurement of neutrino mass. Indeed, I joined the HOLMES collaboration (ERC Advanced Grant 2013 No. 340321), which aims to perform a direct calorimetric measurement of the electronic neutrino mass by studying the electronic capture spectrum of the ¹⁶³Ho. The experiment takes advantage from the usage of cryogenic microcalorimeters implanted with the isotopic species whose spectrum is to be studied. Within the HOLMES collaboration I initially attended (in collaboration with a specialized company, DAN-FYSIK) to the design of an implanter machine with the function of implanting the ¹⁶³Ho within the microcalorimeters. The machine also performed an isotopic separation in order to exclude other isotopic species with mass around 163 a.m.u. that can generate a background for calorimetric measurement. My contribution in the HOLMES collaboration gradually increased over the time until I was appointed, in July 2016, local responsible of the HOLMES Genoa group.

Positions of responsibility

- 2019 - now: **Italian Responsible** of the MEG II Timing Counter.
- 2016 - now: **Local responsible** of the MEG Genoa group.
- 2016 - now: **Local responsible** of the HOLMES Genoa group.
- 2015 - now: **Referee of the 1st INFN Scientific Committee** for the TOTEM experiment.
- 2015: **Shift coordinator** during MEG II pre-engineering runs.

- 2014 - now: **Responsible for the ion implanter commissioning** for the HOLMES experiment.
- 2013 - now: **Co-responsible** (responsibility shared with Tokyo University group) **for the development of the Timing Counter of the MEG II experiment.**
- 2011 - 2013: **Shift coordinator** during MEG physics runs.
- 2009 - 2013: **Expert on call for the Timing Counter detector.**

Publications:

1. D. T. Becker *et al.* [HOLMES Collaboration]. “**Working principle and demonstrator of microwave-multiplexing for the HOLMES experiment microcalorimeters**”
arXiv:1910.05217 [physics.ins-det]
JINST **14**, no. 10, P10035 (2019)
2. A. Puiu *et al.*. “**HOLMES, an experiment for a direct measurement of neutrino mass**”
Nuovo Cim. C **42**, no. 4, 178 (2019).
3. G. Boca *et al.*. “**The laser-based time calibration system for the MEG II pixelated Timing Counter**”
arXiv:1907.00911 [physics.ins-det]
Nuclear Inst. and Methods in Physics Research, A **947** (2019) 162672
4. M. De Gerone *et al.*. “ **^{163}Ho distillation and implantation for the HOLMES experiment**”
Nucl. Instrum. Meth. A **936**, 220 (2019).
5. M. Faverzani *et al.*. “**High energy resolution thermal microcalorimeters for the HOLMES experiment**”
Nucl. Instrum. Meth. A **936**, 180 (2019).
6. P. W. Cattaneo *et al.*. “**Development and commissioning of the 30 ps time resolution MEG II pixelated Timing Detector**”
Nucl. Instrum. Meth. A **936**, 660 (2019).
7. P. W. Cattaneo *et al.*. “**Design and test of the calibration system of the MEGII Pixelated Timing Counter**”
Nucl. Instrum. Meth. A **936**, 300 (2019).
8. M. Usami *et al.*. “**Radiation damage effect on time resolution of 6 series-connected SiPMs for MEG II positron timing counter**”
Nucl. Instrum. Meth. A **936**, 572 (2019).
9. M. De Gerone *et al.*. “**Probing the absolute neutrino mass scale with ^{163}Ho : The HOLMES project**”
Nucl. Instrum. Meth. A **936**, 252 (2019).
10. M. Nakao *et al.*. “**A Laser-based Time Calibration System for the MEG II Timing Counter**”
arXiv:1905.06270 [physics.ins-det]
11. B. Alpert *et al.*. “**High-resolution high-speed microwave-multiplexed low temperature microcalorimeters for the HOLMES experiment**”
Eur. Phys. J. C **79**, no. 4, 304 (2019).
12. B. Alpert *et al.*. “**The HOLMES experiment: status and perspective**”
PoS NOW **2018**, 073 (2019).
13. G. Gallucci *et al.*. “ **^{163}Ho Distillation and Implantation for HOLMES Experiment**”
J. Low. Temp. Phys. **194**, no. 5-6, 453 (2019).
14. M. Nakao *et al.*. “**Results from Pilot Run for MEG II Positron Timing Counter**”
arXiv:1808.07279 [physics.ins-det]
Springer Proc. Phys. **213**, 237 (2018)

15. A. Nucciotti *et al.*. “**Status of the HOLMES Experiment to Directly Measure the Neutrino Mass**”
arXiv:1807.09269 [physics.ins-det]
J. Low. Temp. Phys. **193**, no. 5-6, 1137 (2018)
16. A. Nucciotti *et al.*. “**Direct neutrino mass measurement by the HOLMES experiment**”
J. Phys. Conf. Ser. **1056**, no. 1, 012039 (2018).
17. E. Ferri *et al.*. “**Characterization of the microwave multiplexing readout and TESs for HOLMES**”
J. Phys. Conf. Ser. **1056**, no. 1, 012022 (2018).
18. A. Orlando *et al.*. “**Microfabrication of Transition-Edge Sensor Arrays of Microcalorimeters with ^{163}Ho for Direct Neutrino Mass Measurements with HOLMES**”
J. Low. Temp. Phys. **193**, no. 5-6, 771 (2018).
19. A. Puiu *et al.*. “**Updates on the Transition-Edge Sensors and Multiplexed Readout for HOLMES**”
J. Low. Temp. Phys. **193**, no. 5-6, 1167 (2018).
20. A. M. Baldini *et al.* [MEG II Collaboration]. “**The design of the MEG II experiment**”
arXiv:1801.04688 [physics.ins-det]
Eur. Phys. J. C **78**, no. 5, 380 (2018)
21. S. Heinitz *et al.*. “**Production and separation of ^{163}Ho for nuclear physics experiments**”
PLoS One **13**, no. 8, e0200910 (2018).
22. Y. Uchiyama *et al.*. “**30-ps time resolution with segmented scintillation counter for MEG II**”
Nucl. Instrum. Meth. A **845**, 507 (2017).
23. A. Giachero *et al.*. [HOLMES Collaboration]. “**Measuring the electron neutrino mass with improved sensitivity: the HOLMES experiment**”
JINST **12**, no. 02, C02046 (2017)
24. D. Corsini, M. Biasotti, F. Gatti, M. De Gerone, C. Rossi, L. Piro and C. Macculi. “**The mechanical and EM simulations of the CryoAC for the ATHENA X-IFU**”
Proc. SPIE Int. Soc. Opt. Eng. **9905**, 99055Y (2016).
25. G. Pizzigoni *et al.*. “**Inside HOLMES experiment: ^{163}Ho metallic target production for the micro-calorimeter absorber**”
Nucl. Instrum. Meth. A **824**, 223 (2016).
26. A. M. Baldini *et al.* [MEG Collaboration]. “**Search for the Lepton Flavour Violating Decay $\mu^+ \rightarrow e^+\gamma$ with the Full Dataset of the MEG Experiment**”,
Eur. Phys. J. C **76**, no. 8, 434 (2016)
27. M. De Gerone *et al.*. “**A high resolution Timing Counter for the MEG II experiment**”
Nucl. Instrum. Meth. A **824**, 92 (2016).
28. M. De Gerone *et al.*. “**Properties of single crystal para-terphenyl as medium for high resolution TOF detector**”
Nucl. Instrum. Meth. A **824**, 192 (2016).
29. M. Simonetta *et al.*. “**Test and characterisation of SiPMs for the MEGII high resolution Timing Counter**”
Nucl. Instrum. Meth. A **824**, 145 (2016).
30. G. Pizzigoni *et al.*. “**Inside HOLMES experiment: ^{163}Ho metallic target production for the micro-calorimeter absorber**”
Nucl. Instrum. Meth. A **824**, 223 (2016).
31. A. Nucciotti *et al.*. “**Status of the HOLMES detector development**”
Nucl. Instrum. Meth. A **824**, 182 (2016).
32. M. Faverzani *et al.*. “**The HOLMES Experiment**”
J. Low. Temp. Phys. **184**, no. 3-4, 922 (2016).

33. A. Orlando *et al.*. **“Transition-Edge Sensor Arrays of Microcalorimeters with¹⁶³ Ho for Direct Neutrino Mass Measurements with HOLMES”**
J. Low. Temp. Phys. **184**, no. 3-4, 892 (2016).
34. M. Nishimura *et al.*. **“Pixelated Positron Timing Counter with SiPM-readout Scintillator for MEG II experiment”**
PoS PhotoDet **2015**, 011 (2016).
35. M. Biasotti, V. Ceriale, D. Corsini, M. De Gerone, F. Gatti, A. Orlando and G. Pizzigoni. **“Fabrication and Test of Large Area Spider-Web Bolometers for CMB Measurements”**
J. Low. Temp. Phys. **184**, no. 3-4, 642 (2016).
36. P. W. Cattaneo, M. De Gerone, F. Gatti, M. Nishimura, W. Ootani, M. Rossella, S. Shirabe and Y. Uchiyama. **“Time resolution of time-of-flight detector based on multiple scintillation counters readout by SiPMs”**
Nucl. Instrum. Meth. A **828**, 191 (2016)
37. A. M. Baldini *et al.* [MEG Collaboration]. **“Muon polarization in the MEG experiment: predictions and measurements”**
Eur. Phys. J. C **76**, no. 4, 223 (2016)
38. M. De Gerone. **“Probing the absolute neutrino mass scale with 163 Ho: the HOLMES project”**
Nucl. Part. Phys. Proc. **265-266**, 77 (2015).
39. A. Puiu *et al.*. **“HOLMES, an experiment for a direct measurement of neutrino mass”**
PoS NEUTEL **2015**, 080 (2015).
40. B. Alpert *et al.*. **“HOLMES - The Electron Capture Decay of ¹⁶³Ho to Measure the Electron Neutrino Mass with sub-eV sensitivity”**
Eur. Phys. J. C **75**, no. 3, 112 (2015)
41. M. De Gerone [MEG Collaboration]. **“The MEG experiment at PSI”**
EPJ Web Conf. **73**, 07002 (2014).
42. A. Papa, G. Cavoto, E. Ripiccini and M. De. Gerone. **“A simulation tool for scintillating fibers coupled to SiPM for MIP and heavy ionizing particle identification”**
JINST **9**, C05066 (2014).
43. A. Papa, M. De Gerone, S. Dussoni, L. Galli, D. Nicolo and G. Signorelli. **“Feasibility study of a high-performance LaBr₃(Ce) calorimeter for future lepton flavor violation experiments”**
Nucl. Phys. Proc. Suppl. **248-250**, 115 (2014).
44. J. Adam *et al.*. **“Measurement of Inner Bremsstrahlung in Polarized Muon Decay with MEG”**
Nucl. Phys. Proc. Suppl. **248-250**, 108 (2014).
45. L. Galli *et al.*. **“Operation and performance of the trigger system of the MEG experiment”**
JINST **9**, P04022 (2014).
46. P. W. Cattaneo, M. De Gerone, F. Gatti, M. Nishimura, W. Ootani, M. Rossella and Y. Uchiyama. **“Development of High Precision Timing Counter Based on Plastic Scintillator with SiPM Readout”**
IEEE Trans. Nucl. Sci. **61**, no. 5, 2657 (2014)
47. A. M. Baldini *et al.* [MEG Collaboration]. **“Measurement of the radiative decay of polarized muons in the MEG experiment”**
Eur. Phys. J. C **76**, no. 3, 108 (2016)
48. M. De Gerone, F. Gatti, W. Ootani, Y. Uchiyama, M. Nishimura, S. Shirabe, P. W. Cattaneo and M. Rossella. **“Design and test of an extremely high resolution Timing Counter for the MEG II experiment: preliminary results”**
JINST **9**, C02035 (2014)

49. D. Barret *et al.*. “**The Hot and Energetic Universe: The X-ray Integral Field Unit (X-IFU) for Athena+**”
arXiv:1308.6784 [astro-ph.IM]
50. L. Galli, M. De Gerone, S. Dussoni, D. Nicolo, A. Papa, F. Tenchini and G. Signorelli. “**Timing resolution measurements of a 3 in. lanthanum bromide detector**”
Nucl. Instrum. Meth. A **718**, 48 (2013).
51. J. Adam *et al.*. “**The MEG detector for $\mu^+ \rightarrow e^+\gamma$ decay search**”
Eur. Phys. J. C **73**, no. 4, 2365 (2013)
52. J. Adam *et al.* [MEG Collaboration]. “**New constraint on the existence of the $\mu^+ \rightarrow e^+\gamma$ decay**”
Phys. Rev. Lett. **110**, 201801 (2013)
53. A. M. Baldini *et al.*. “**MEG Upgrade Proposal**”
arXiv:1301.7225 [physics.ins-det]
54. M. De Gerone [MEG Collaboration]. “**Latest results from the MEG experiment**”
Nuovo Cim. C **036**, no. 01, 34 (2013).
55. M. De Gerone [MEG Collaboration]. “**New results on lepton flavor violation from MEG**”
AIP Conf. Proc. **1560**, 103 (2013).
56. M. De Gerone [MEG Collaboration]. “**Latest results from the MEG experiment**”
Nucl. Phys. Proc. Suppl. **233**, 231 (2012).
57. M. De Gerone *et al.*. “**Development and commissioning of the Timing Counter for the MEG Experiment**” IEEE Trans. Nucl. Sci. **59**, no 2, 379 (2012)
58. M. De Gerone [MEG Collaboration]. “ **$\mu \rightarrow e\gamma$ and $\mu \rightarrow eee$ Status and perspectives**”
arXiv:1108.2670 [hep-ex]
59. J. Adam *et al.* [MEG Collaboration]. “**New limit on the lepton-flavour violating decay $\mu^+ \rightarrow e^+\gamma$** ”
Phys. Rev. Lett. **107**, 171801 (2011)
60. J. Adam *et al.* [MEG Collaboration]. “**Calibration and monitoring of the MEG experiment by a proton beam from a Cockcroft-Walton accelerator**”
Nucl. Instrum. Meth. A **641**, 19 (2011).
61. M. De Gerone *et al.*. “**The MEG timing counter calibration and performance**”
Nucl. Instrum. Meth. A **638**, 41 (2011).
62. P. W. Cattaneo, M. De Gerone, S. Dussoni, F. Gatti, M. Rossella, Y. Uchiyama and R. Valle. “**The Timing Counter of the MEG experiment: calibration and performance**”
Nucl. Phys. Proc. Suppl. **215**, 281 (2011)
63. S. Dussoni, M. De Gerone, F. Gatti, R. Valle, M. Rossella, R. Nardo and P. W. Cattaneo. “**The Timing Counter of the MEG experiment: Design and commissioning**”
Nucl. Instrum. Meth. A **617**, 387 (2010).
64. M. De Gerone. “**The Timing Counter of the MEG experiment: Design and commissioning**”
DOI:10.1109/NSSMIC.2010.5873885
65. J. Adam *et al.* [MEG Collaboration]. “**A limit for the $\mu \rightarrow e\gamma$ decay from the MEG experiment**”
Nucl. Phys. B **834**, 1 (2010)
66. M. De Gerone, S. Dussoni, F. Gatti, M. Rossella and R. Valle. “**Development and characterization of scintillating fiber: APD-based detector**”
Nucl. Instrum. Meth. A **610**, 218 (2009).
67. R. Valle, M. De Gerone, S. Dussoni and F. Gatti. “**Positron timing and detection in the MEG experiment**”
PoS NUFACT **08**, 104 (2008).

Partecipazioni a scuole e conferenze

- 18th International Workshop on Low Temperature Detector, Milan, (Italy, 2019), Presentazione del poster “163-Ho distillation and implantation for the HOLMES experiment”.
- 19th Lomonosov conference on elementary particle physics, Moscow (Russia, 2019), Presentazione orale su invito “An experimental review of charged lepton flavour violating experiments: the muon channel”.
- ECT* workshop: Determination of the Effective Electron (anti)-neutrino Mass, Trento (2018, Italy) Presentazione del poster “163-Ho distillation and implantation for the HOLMES experiment”.
- Frontier Detectors for Frontier Physics, 14th Pisa Meeting on Advanced Detectors, La Biodola, Isola d’Elba (2018, Italy), Presentazione dei poster “163-Ho distillation and implantation for the HOLMES experiment” e “Probing the absolute neutrino mass scale with the Ho-163: the HOLMES project”.
- TAUP2017, XV International Conference on Topics in Astroparticle and Underground Physics, Sudbury (2017, Canada), Presentazione orale “Probing the absolute neutrino mass scale with the Ho-163: the HOLMES project”.
- Frontier Detectors for Frontier Physics, 13th Pisa Meeting on Advanced Detectors, La Biodola, Isola d’Elba (2015, Italy), Presentazione orale “A high resolution Timing Counter for the MEG II experiment”.
- NOW 2014, Neutrino Oscillation Workshop, Otranto (Italy, 2014), Presentazione orale su invito “Probing the absolute neutrino mass scale with ^{163}Ho : the HOLMES project”.
- PASCOS 2013, 19th International Symposium on Particles, Strings and Cosmology, Taipei (Taiwan, 2013), Presentazione orale “The MEG experiment at PSI: recent results and outlook”.
- MENU 2013, 13th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon, Rome (Italy, 2013), Presentazione orale su invito “The MEG experiment at PSI”.
- IPRD 2013, 13th Topical Seminar on Innovative Particle and Radiation Detectors, Siena (Italy, 2013), Presentazione orale “An extreme high resolution Timing Counter for the MEG upgrade”.
- 2013 Nuclear Science Symposium, Seoul (2013). Presentazione del poster: “Properties of single crystal para-terphenyl as medium for high resolution TOF detector”.
- CIPANP 2012, Eleventh Conference on the Intersections of Particle and Nuclear Physics, St.Petersburg (USA, 2012), Presentazione orale “Latest results from the MEG experiment”.
- Incontri di Fisica delle alte Energie, Ferrara (2012), Presentazione orale “Last results from the MEG Experiment”.
- Flavour Physics and CP violation 2011, Kibbutz Maale Hachamisha (2011), Presentazione orale su invito “ $\mu \rightarrow e\gamma$ and $\mu \rightarrow eee$ status and perspectives”.
- 2010 Nuclear Science Symposium, Knoxville (2010). Presentazione del poster: “The Timing Counter of the MEG Experiment: Design and commissioning”
- XCV Congresso Nazionale della Società italiana di Fisica, Bari (2009), Presentazione orale “The Timing Counter of the MEG Experiment”.
- International School of Physics “E. Fermi” (Measurement of neutrino mass), Varenna (2009).
- New Development in Photodetection, Aix-Les-Bains (2009). Presentazione del poster: “Development and characterization of scintillating fiber-APD based detector”.
- XVIII Giornate di Studio sui Rivelatori, Villa Gualino (2008).

Teaching

- A.A. 2008/2010: Teaching fellow in General Physics, Computer Engineering Department, Genoa University.
- A.A. 2016/2020: Teaching fellow in Experimental Physics, Physics Department, Genoa University.

- A.A. 2016/2017: Assistant Professor in General Physics, Computer Science Department, Genoa University.

I authorize the processing of my personal data according to Dlgs 196, 30 June 2003.

A handwritten signature in black ink, appearing to read "Matteo De Gerone". The signature is written in a cursive style and is partially obscured by two large black circular redaction marks.