Curriculum Vitae

Pasquale Maddaloni, PhD

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Personal Information

Full Name	Pasquale Maddaloni (PM)
Address	Via Fossogrande 8, 80056 Ercolano (Napoli), Italy
Nationality, Gender	Italy, M
Birth	Castellammare di Stabia (Napoli), 16/02/1975
ORCID ID	0000-0001-9971-406X

Education and career

2020 – present
Senior Researcher
Consiglio Nazionale delle Ricerche - Istituto Nazionale di Ottica (CNR-INO).
Via Campi Flegrei 34, Pozzuoli, I-80078, Italy.

2017 – 2028
Abilitazione scientifica nazionale (ASN) II fascia
BANDO D.D. 1532/2016, Sett. Conc. 02/B1 - Fisica Sperimentale della Materia (12/04/2017–12/04/2028).

Since 2012
Founder and manager of the "Cold Molecules" laboratory at CNR-INO Pozzuoli.

2005 – 2019
Research Scientist (staff member since 2009)
CNR-INO, Pozzuoli.

2002 – 2004
Research Grant
Istituto Nazionale di Ottica Applicata, Pozzuoli.

1999 – 2002
PhD Degree in Physics
Università degli Studi di Padova, Italy.
Doctoral Thesis: Experiments on Macroscopic Quantum Coherence in Bose-Einstein Condensates (supervisors: prof. M. Inguscio and prof. R. Onofrio).

1994 – 1999
Bachelor's Degree in Physics "cum laude"
Università degli Studi di Napoli "Federico II", Italy.
Thesis: Magneto-optical trapping of ^{87}Rb atoms (supervisor: prof. G. M. Tino).

Scientific Activity and Expertise

- Buffer gas cooling of molecular samples
- Precision spectroscopy and absolute frequency metrology assisted by optical frequency comb synthesizers for fundamental Physics studies
- Non-linear & Quantum optics: development of novel mid-infrared coherent radiation sources
- High-resolution and high-sensitivity molecular spectroscopy: environmental monitoring and cultural heritage diagnostics with optical devices
- Ultracold atoms

Research Projects

Coordination

2019–present — **Manager of the "FixLab Pozzuoli" facility within the project SHINE** (StrengtHening the Italian Nodes of E-RIHS) - MIUR Azione II.1 del PON Ricerca e Innovazione 2014-2020, **Budget** $\simeq$ 1 **M€**. *The facility includes: the C14-SCAR spectrometer, based on a 4.5-μm-wavelength quantum cascade laser (QCL) and the Saturated-absorption CAvity Ring-down (SCAR) technique, for radiocarbon dating of archaeological finds with performance comparable to those of AMS infrastructures; a THz spectrometer (based on asynchronous optical sampling) for chemical fingerprinting of artifacts via time-domain spectroscopy or imaging techniques.*

2014–2022 — **National coordinator of the Project SUPREMO** (Sounding the time Unwinding of the PRoton-to-Electron Mass ratiO) - INFN/Csn2, **Total Budget** $\simeq$ 750 **k€**. *The main goal is to test the time stability of the proton-to-electron mass ratio at the 10^{-14}/yr level by precision spectroscopy of a buffer-gas-cooled molecular beam, for new tests of modern multidimensional theories (String-type) beyond the Standard Model. The pilot test (at 10^{-12}/yr level), performed in the near-IR on acetylene, represents the accuracy record for spectroscopic frequency measurements on ro-vibrational transitions of cold stable molecules, thus paving the way for the implementation of a more sophisticated interrogation scheme (two-photon Ramsey fringes in the spatial domain) on a buffer-gas-cooled fluoroform beam.*

2016–2018 — **Local coordinator of the Project AXIOMA** (AXIOn dark MAtter detection) - INFN/Csn5, **Budget** $\simeq$ 100 **k€**. *It is a feasibility study for detecting Quantum Chromodynamics (QCD) dark matter axions using matrix isolation spectroscopy.*

2012–2015 — **National coordinator of the Project FIRB-RBFR1006TZ** (Cold molecules for ultrahigh-resolution ro-vibrational spectroscopy assisted by optical frequency comb synthesizers) - MIUR/Futuro in ricerca 2010, **Total Budget** $\simeq$ 850 **k€**. *It is the first Italian experiment in the emerging field of cold stable molecules (as opposed to dimers obtained by magneto/photo association of ultracold alkaline atoms). It culminates in the realization of a sophisticated buffer gas cooling (BGC) source for the creation of cryogenic samples down to a few Kelvin, in view of ultra-precise spectroscopic frequency measurements.*

Research Projects (continued)

Participation (selected projects)

2023–present — **Participant in the project QASINO** (Laboratori congiunti ASI-CNR nel settore delle Quantum Technologies), **Budget (up to now)** $\simeq$ 50 **k€**.

2022–present — **CNR-INO-Pozzuoli referent for Spoke 3 (atomic/molecular platforms for quantum technologies) of the project NQSTI** (National Quantum Science and Technology Institute) - Partenariato Esteso 04: Scienze e Tecnologie Quantistiche, finanziato nell'ambito del PNRR con Decreto Direttoriale n. 1243 del 02/08/2022, **Budget** $\simeq$ 1 **M€**. *The activity will focus on the realization of quantum sensors of fundamental Physics, based on the production of molecular samples at cryogenic temperatures by the BGC technique, and their combination with cavity-enhanced precision spectroscopy in the Lamb-dip regime. The main goal is to set new bounds on putative fifth forces beyond the Standard Model, by accomplishing sub-kHz-accuracy line-center frequency determinations for selected hydrogen deuteride (HD) ro-vibrational transitions in the (2,0)/(1,0) overtone/fundamental band at 1.4/2.7 micron wavelength.*

2018–2023 — **CNR-INO referent of the project E-CROPS** (Tecnologie per l'agricoltura digitale sostenibile) - PON "R&I" 2014-2020/Agrifood, **Budget** $\simeq$ 190 **k€**. *Realization of a spectrometer based on a 8.6-μm QCL and the off-axis integrated cavity output spectroscopy (OA-ICOS) technique for the early detection of volatile organic compounds (VOCs) emitted by plants subjected to biotic and abiotic stress.*

2018–2022 — **CNR-INO measurement campaign referent of the Project OT4CLIMA** (Tecnologie di osservazione terrestre innovative per lo studio degli impatti del cambiamento climatico sull'ambiente) - PON "R&I" 2014-2020/Aerospazio. *Development of a 4.5-μm QCL spectrometer for off-line measurements of carbon dioxide concentrations in gaseous samples taken at a chosen site (S. Paolo Albanese).*

Research Publications

Journal Articles H-index=25 (Scopus)

1. A. Martinez, V. Di Sarno, **P. Maddaloni**, A. Rocco, M. Paturzo, M. Ruocco, and D. Paparo, "Chestnut quality classification by thz time-domain hyperspectral imaging combined with unsupervised learning analysis," *Food Control*, vol. 168, p. 110 878, 2025. DOI: 10.1016/j.foodcont.2024.110878.
2. S. Castrignano, I. Ricciardi, **P. Maddaloni**, P. De Natale, S. Wabnitz, and M. De Rosa, "Observation of quantum-correlated twin beams in cascaded nonlinear interactions," *Optics Letters*, vol. 49, p. 1733, 2024. DOI: 10.1364/OL.514976.
3. R. Aiello, V. Di Sarno, M. G. Delli Santi, M. D. Rosa, I. Ricciardi, P. De Natale, L. Santamaria Amato, G. Giusfredi, and **P. Maddaloni**, "Absolute frequency metrology of buffer-gas-cooled molecular spectra at 1 kHz accuracy level," *Nature Communications*, vol. 13, p. 7016, 2022. DOI: 10.1038/s41467-022-34758-9.
4. R. Aiello, V. Di Sarno, M. G. Delli Santi, M. D. Rosa, I. Ricciardi, G. Giusfredi, P. De Natale, L. Santamaria Amato, and **P. Maddaloni**, "Lamb-dip saturated-absorption cavity ring-down rovibrational molecular spectroscopy in the near-infrared," *Photonics Research*, vol. 10, p. 1803, 2022. DOI: 10.1364/PRJ.456515.

5 D. D'Ambrosio, M. Capezzuto, R. Aiello, M. G. Delli Santi, A. Sorgi, P. Malara, S. Avino, A. Giorgini, **P. Maddaloni**, L. Consolino, M. S. Vitiello, P. De Natale, and G. Gagliardi, "Infrared-to-THz Detection and Spectroscopy with Whispering-Gallery-Mode Microresonators," *Advanced Photonics Research*, vol. 3, p. 2 200 147, 2022. DOI: 10.1002/adpr.202200147.

6 I. Ricciardi, **P. Maddaloni**, P. De Natale, M. Erkintalo, T. Hansson, A. Arie, S. Wabnitz, and M. De Rosa, "Optical Frequency Combs in Dispersion-controlled Doubly Resonant Second-Harmonic Generation," *Optics Express*, vol. 30, p. 45 694, 2022. DOI: 10.1364/oe.472424.

7 L. Santamaria, V. Di Sarno, R. Aiello, M. De Rosa, I. Ricciardi, P. De Natale, and **P. Maddaloni**, "Infrared comb spectroscopy of buffer-gas-cooled molecules: Toward absolute frequency metrology of cold acetylene," *International Journal of Molecular Sciences*, vol. 22, p. 250, 2021. DOI: 10.3390/ijms22010250.

8 C. Clivati, R. Aiello, G. Bianco, C. Bortolotti, P. De Natale, V. Di Sarno, **P. Maddaloni**, G. Maccaferri, A. Mura, M. Negusini, F. Levi, F. Perini, R. Ricci, M. Roma, L. Santamaria Amato, M. Siciliani de Cumis, M. Stagni, A. Tuozzi, and D. Calonico, "Common-clock very long baseline interferometry using a coherent optical fiber link," *Optica*, vol. 7, p. 1031, 2020. DOI: 10.1364/optica.393356.

9 P. Malara, A. Giorgini, S. Avino, V. Di Sarno, R. Aiello, **P. Maddaloni**, P. De Natale, and G. Gagliardi, "A self-operating broadband spectrometer on a droplet," *Nature Communications*, vol. 11, p. 2263, 2020. DOI: 10.1038/s41467-020-16206-8.

10 I. Ricciardi, S. Mosca, M. Parisi, F. Leo, T. Hansson, M. Erkintalo, **P. Maddaloni**, P. De Natale, S. Wabnitz, and M. De Rosa, "Optical frequency combs in quadratically nonlinear resonators," *Micromachines*, vol. 11, p. 230, 2020. DOI: 10.3390/mi11020230.

11 E. Vicentini, A. Gambetta, N. Coluccelli, V. Di Sarno, **P. Maddaloni**, P. De Natale, A. Castrillo, L. Gianfrani, P. Laporta, and G. Galzerano, "Absolute frequency stabilization of a QCL at 8.6 μm by modulation transfer spectroscopy," *Optics Letters*, vol. 45, p. 4948, 2020. DOI: 10.1364/ol.401265.

12 E. Vicentini, **P. Maddaloni**, R. Aiello, A. Gambetta, N. Coluccelli, L. M. Molteni, A. Castrillo, L. Gianfrani, P. De Natale, P. Laporta, and G. Galzerano, "Absolute frequency metrology of the CHF_3 8.6-μm ro-vibrational spectrum at 10^{-11} level," *Journal of Quantitative Spectroscopy and Radiative Transfer*, vol. 248, p. 106 963, 2020. DOI: 10.1016/j.jqsrt.2020.106963.

13 S. Borri, G. Insero, G. Santambrogio, D. Mazzotti, F. Cappelli, I. Galli, G. Galzerano, M. Marangoni, P. Laporta, V. Di Sarno, L. Santamaria, **P. Maddaloni**, and P. De Natale, "High-precision molecular spectroscopy in the mid-infrared using quantum cascade lasers," *Applied Physics B: Lasers and Optics*, vol. 125, p. 18, 2019. DOI: 10.1007/s00340-018-7119-2.

14 V. Di Sarno, R. Aiello, M. De Rosa, I. Ricciardi, S. Mosca, G. Notariale, P. De Natale, L. Santamaria, and **P. Maddaloni**, "Lamb-dip spectroscopy of buffer-gas-cooled molecules," *Optica*, vol. 6, p. 436, 2019. DOI: 10.1364/optica.6.000436.

15 V. Di Sarno, P. De Natale, J. Tasseva, L. Santamaria, E. Cané, F. Tamassia, and **P. Maddaloni**, "Frequency-comb-assisted absolute calibration and linestrength of $H^{12}C^{13}CH$ ro-vibrational transitions in the $2\nu_3 - GS$ band," *Journal of Quantitative Spectroscopy and Radiative Transfer*, vol. 206, p. 31, 2018. DOI: 10.1016/j.jqsrt.2017.10.030.

16 A. Gambetta, E. Vicentini, N. Coluccelli, Y. Wang, T. T. Fernandez, **P. Maddaloni**, P. De Natale, A. Castrillo, L. Gianfrani, P. Laporta, and G. Galzerano, "Versatile mid-infrared frequency-comb referenced sub-Doppler spectrometer," *APL Photonics*, vol. 3, p. 046 103, 2018. DOI: 10.1063/1.5025135.

17 S. Mosca, M. Parisi, I. Ricciardi, F. Leo, T. Hansson, M. Erkintalo, **P. Maddaloni**, P. De Natale, S. Wabnitz, and M. De Rosa, "Modulation Instability Induced Frequency Comb Generation in a Continuously Pumped Optical Parametric Oscillator," *Physical Review Letters*, vol. 121, p. 093 903, 2018. DOI: 10.1103/PhysRevLett.121.093903.

18 E. Vicentini, A. Gambetta, N. Coluccelli, E. Fasci, A. Castrillo, L. Gianfrani, V. Di Sarno, **P. Maddaloni**, A. Ceausu-Velcescu, P. De Natale, Y. Wang, T. T. Fernandez, P. Laporta, and G. Galzerano, "Rovibrational fine structure and transition dipole moment of CF_3H by frequency-comb-assisted saturated spectroscopy at 8.6 μm," *Journal of Quantitative Spectroscopy and Radiative Transfer*, vol. 217, p. 373, 2018. DOI: 10.1016/j.jqsrt.2018.06.013.

19 C. Braggio, G. Carugno, F. Chiossi, A. Di Lieto, M. Guarise, **P. Maddaloni**, A. Ortolan, G. Ruoso, L. Santamaria, J. Tasseva, and M. Tonelli, "Axion dark matter detection by laser induced fluorescence in rare-earth doped materials," *Scientific Reports*, vol. 7, p. 15 168, 2017. DOI: 10.1038/s41598-017-15413-6.

20 T. T. Fernandez, M. K. Tarabrin, Y. Wang, V. A. Lazarev, S. O. Leonov, V. E. Karasik, Y. V. Korostelin, M. P. Frolov, Y. P. Podmarkov, Y. K. Skasyrsky, V. I. Kozlovsky, C. Svelto, **P. Maddaloni**, N. Coluccelli, P. Laporta, and G. Galzerano, "Thermo-optical and lasing characteristics of Cr^{2+}-doped CdSe single crystal as tunable coherent source in the mid-infrared," *Optical Materials Express*, vol. 7, p. 3815, 2017. DOI: 10.1364/ome.7.003815.

21 A. Gambetta, E. Vicentini, Y. Wang, N. Coluccelli, E. Fasci, L. Gianfrani, A. Castrillo, V. Di Sarno, L. Santamaria, **P. Maddaloni**, P. De Natale, P. Laporta, and G. Galzerano, "Absolute frequency measurements of CHF_3 Doppler-free ro-vibrational transitions at 8.6 μm," *Optics Letters*, vol. 42, p. 1911, 2017. DOI: 10.1364/ol.42.001911.

22 **P. Maddaloni**, S. Bartalini, P. Cancio, M. De Rosa, D. Mazzotti, and P. De Natale, "Frontiers of molecular gas sensing," *Rivista del Nuovo Cimento*, vol. 40, p. 135, 2017. DOI: 10.1393/ncr/i2017-10133-9.

23 S. Mosca, I. Ricciardi, M. Parisi, **P. Maddaloni**, L. Santamaria, P. De Natale, and M. De Rosa, "Direct generation of optical frequency combs in $\chi(2)$ nonlinear cavities," *Nanophotonics*, vol. 5, p. 316, 2016. DOI: 10.1515/nanoph-2016-0023.

24 L. Santamaria, V. Di Sarno, P. De Natale, M. De Rosa, M. Inguscio, S. Mosca, I. Ricciardi, D. Calonico, F. Levi, and **P. Maddaloni**, "Comb-assisted cavity ring-down spectroscopy of a buffer-gas-cooled molecular beam," *Physical Chemistry Chemical Physics*, vol. 18, p. 16 715, 2016. DOI: 10.1039/c6cp02163h.

25 A. Gambetta, N. Coluccelli, M. Cassinerio, T. T. Fernandez, D. Gatti, A. Castrillo, A. Ceausu-Velcescu, E. Fasci, L. Gianfrani, L. Santamaria, V. Di Sarno, **P. Maddaloni**, P. De Natale, P. Laporta, and G. Galzerano, "Frequency-comb-assisted precision laser spectroscopy of CHF_3 around 8.6 μm," *Journal of Chemical Physics*, vol. 143, p. 234 202, 2015. DOI: 10.1063/1.4937424.

26 I. Ricciardi, S. Mosca, M. Parisi, **P. Maddaloni**, L. Santamaria, P. De Natale, and M. De Rosa, "Sub-kilohertz linewidth narrowing of a mid-infrared optical parametric oscillator idler frequency by direct cavity stabilization," *Optics Letters*, vol. 40, p. 4743, 2015. DOI: 10.1364/ol.40.004743.

27 I. Ricciardi, S. Mosca, M. Parisi, **P. Maddaloni**, L. Santamaria, P. De Natale, and M. De Rosa, "Frequency comb generation in quadratic nonlinear media," *Physical Review A - Atomic, Molecular, and Optical Physics*, vol. 91, p. 063 839, 2015. DOI: 10.1103/PhysRevA.91.063839.

28 L. Santamaria, C. Braggio, G. Carugno, V. Di Sarno, **P. Maddaloni**, and G. Ruoso, "Axion dark matter detection by laser spectroscopy of ultracold molecular oxygen: A proposal," *New Journal of Physics*, vol. 17, p. 113 025, 2015. DOI: 10.1088/1367-2630/17/11/113025.

29 L. Santamaria, V. Di Sarno, I. Ricciardi, M. De Rosa, S. Mosca, G. Santambrogio, **P. Maddaloni**, and P. De Natale, "Low-temperature spectroscopy of the $^{12}C_2H_2$ $(\upsilon_1 + \upsilon_3)$ band in a helium buffer gas," *Astrophysical Journal*, vol. 801, p. 50, 2015. DOI: 10.1088/0004-637X/801/1/50.

30 L. Santamaria, V. Di Sarno, I. Ricciardi, S. Mosca, M. De Rosa, G. Santambrogio, **P. Maddaloni**, and P. De Natale, "Assessing the time constancy of the proton-to-electron mass ratio by precision ro-vibrational spectroscopy of a cold molecular beam," *Journal of Molecular Spectroscopy*, vol. 300, p. 116, 2014. DOI: 10.1016/j.jms.2014.03.013.

31 I. Ricciardi, S. Mosca, **P. Maddaloni**, L. Santamaria, M. De Rosa, and P. De Natale, "Phase noise analysis of a 10 Watt Yb-doped fibre amplifier seeded by a 1-Hz-linewidth laser," *Optics Express*, vol. 21, p. 14 618, 2013. DOI: 10.1364/oe.21.014618.

32 I. Ricciardi, E. De Tommasi, **P. Maddaloni**, S. Mosca, A. Rocco, J.-J. Zondy, M. De Rosa, and P. De Natale, "A narrow-linewidth optical parametric oscillator for mid-infrared high-resolution spectroscopy," *Molecular Physics*, vol. 110, p. 2103, 2012. DOI: 10.1080/00268976.2012.699640.

33 I. Ricciardi, E. De Tommasi, **P. Maddaloni**, S. Mosca, A. Rocco, J.-J. Zondy, M. De Rosa, and P. De Natale, "Frequency-comb-referenced singly-resonant OPO for sub-Doppler spectroscopy," *Optics Express*, vol. 20, p. 9178, 2012. DOI: 10.1364/OE.20.009178.

34 P. Cancio, S. Bartalini, S. Borri, I. Galli, G. Gagliardi, G. Giusfredi, **P. Maddaloni**, P. Malara, D. Mazzotti, and P. De Natale, "Frequency-comb-referenced mid-IR sources for next-generation environmental sensors," *Applied Physics B: Lasers and Optics*, vol. 102, p. 255, 2011. DOI: 10.1007/s00340-010-4216-2.

35 **P. Maddaloni**, P. Malara, and P. De Natale, "Simulation of Dicke-narrowed molecular spectra recorded by off-axis high-finesse optical cavities," *Molecular Physics*, vol. 108, p. 749, 2010. DOI: 10.1080/00268971003601571.

36 **P. Maddaloni**, P. Malara, E. De Tommasi, M. De Rosa, I. Ricciardi, G. Gagliardi, F. Tamassia, G. Di Lonardo, and P. De Natale, "Absolute measurement of the S(0) and S(1) lines in the electric quadrupole fundamental band of D_2 around 3 μm," *Journal of Chemical Physics*, vol. 133, p. 154 317, 2010. DOI: 10.1063/1.3493393.

37 **P. Maddaloni**, P. Cancio, and P. De Natale, "Optical comb generators for laser frequency measurement," *Measurement Science and Technology*, vol. 20, p. 052 001, 2009. DOI: 10.1088/0957-0233/20/5/052001.

38 **P. Maddaloni**, M. Paturzo, P. Ferraro, P. Malara, P. De Natale, M. Gioffré, G. Coppola, and M. Iodice, "Mid-infrared tunable two-dimensional Talbot array illuminator," *Applied Physics Letters*, vol. 94, p. 121 105, 2009. DOI: 10.1063/1.3109794.

39 P. Malara, **P. Maddaloni**, G. Gagliardi, and P. De Natale, "Absolute frequency measurement of molecular transitions by a direct link to a comb generated around 3-μm," *Optics Express*, vol. 16, p. 8242, 2008. DOI: 10.1364/oe.16.008242.

40 P. Malara, **P. Maddaloni**, G. Mincuzzi, S. De Nicola, and P. De Natale, "Non-collinear quasi phase matching and annular profiles in difference frequency generation with focused Gaussian beams," *Optics Express*, vol. 16, p. 8056, 2008. DOI: 10.1364/oe.16.008056.

41 **P. Maddaloni**, P. Malara, G. Gagliardi, and P. De Natale, "Mid-infrared fibre-based optical comb," *New Journal of Physics*, vol. 8, p. 262, 2006. DOI: 10.1088/1367-2630/8/11/262.

42 **P. Maddaloni**, P. Malara, G. Gagliardi, and P. De Natale, "Two-tone frequency modulation spectroscopy for ambient-air trace gas detection using a portable difference-frequency source around 3 μm," *Applied Physics B: Lasers and Optics*, vol. 85, p. 219, 2006. DOI: 10.1007/s00340-006-2299-6.

43 **P. Maddaloni**, G. Gagliardi, P. Malara, and P. De Natale, "Off-axis integrated-cavity-output spectroscopy for trace-gas concentration measurements: modeling and performance," *Journal of the Optical Society of America B*, vol. 23, p. 1938, 2006. DOI: 10.1364/josab.23.001938.

44 P. Malara, **P. Maddaloni**, Gagliardi, and P. De Natale, "Combining a difference-frequency source with an off-axis high-finesse cavity for trace-gas monitoring around 3 μm," *Optics Express*, vol. 14, p. 1304, 2006. DOI: 10.1364/oe.14.001304.

45 **P. Maddaloni**, G. Gagliardi, P. Malara, and P. De Natale, "A 3.5-mW continuous-wave difference-frequency source around 3 μm for sub-Doppler molecular spectroscopy," *Applied Physics B: Lasers and Optics*, vol. 80, p. 141, 2005. DOI: 10.1007/s00340-004-1714-0.

46 **P. Maddaloni**, G. Coppola, P. De Natale, S. De Nicola, P. Ferraro, M. Gioffré, and M. Iodice, "Thickness measurement of thin transparent plates with a broad-band wavelength scanning interferometer," *IEEE Photonics Technology Letters*, vol. 16, p. 1349, 2004. DOI: 10.1109/LPT.2004.826150.

47 F. S. Cataliotti, L. Fallani, F. Ferlaino, C. Fort, **P. Maddaloni**, and M. Inguscio, "Dynamics of a trapped Bose-Einstein condensate in the presence of a one-dimensional optical lattice," *Journal of Optics B: Quantum and Semiclassical Optics*, vol. 5, S17, 2003. DOI: 10.1088/1464-4266/5/2/353.

48 F. S. Cataliotti, L. Fallani, F. Ferlaino, C. Fort, **P. Maddaloni**, and M. Inguscio, "Superfluid current disruption in a chain of weakly coupled Bose-Einstein condensates," *New Journal of Physics*, vol. 5, p. 71, 2003. DOI: 10.1088/1367-2630/5/1/371.

49 C. Fort, F. S. Cataliotti, L. Fallani, F. Ferlaino, **P. Maddaloni**, and M. Inguscio, "Collective Excitations of a trapped Bose-Einstein Condensate in the presence of a 1D Optical Lattice," *Physical Review Letters*, vol. 90, p. 140 405, 2003. DOI: 10.1103/PhysRevLett.90.140405.

50 A. Smerzi, A. Trombettoni, T. Lopez-Arias, C. Fort, **P. Maddaloni**, F. Minardi, and M. Inguscio, "Macroscopic oscillations between two weakly coupled Bose-Einstein condensates," *European Physical Journal B*, vol. 31, no. 4, p. 457, 2003. DOI: 10.1140/epjb/e2003-00055-1.

51 F. Ferlaino, **P. Maddaloni**, S. Burger, F. S. Cataliotti, C. Fort, M. Modugno, and M. Inguscio, "Dynamics of a Bose-Einstein condensate at finite temperature in an atom-optical coherence filter," *Physical Review A - Atomic, Molecular, and Optical Physics*, vol. 66, 011604(R), 2002. DOI: 10.1103/PhysRevA.66.011604.

52 S. Burger, F. S. Cataliotti, C. Fort, **P. Maddaloni**, F. Minardi, and M. Inguscio, "Quasi-2D Bose-Einstein condensation in an optical lattice," *Europhysics Letters*, vol. 57, p. 1, 2001. DOI: 10.1209/epl/i2002-00532-1.

53 F. S. Cataliotti, S. Burger, C. Fort, **P. Maddaloni**, F. Minardi, A. Trombettoni, A. Smerzi, and M. Inguscio, "Josephson junction arrays with Bose-Einstein condensates," *Science*, vol. 293, p. 843, 2001. DOI: 10.1126/science.1062612.

54 C. Fort, **P. Maddaloni**, F. Minardi, M. Modugno, and M. Inguscio, "Spatial interference of coherent atomic waves by manipulation of the internal quantum state," *Optics Letters*, vol. 26, p. 1039, 2001. DOI: 10.1364/OL.26.001039.

55 F. Minardi, C. Fort, **P. Maddaloni**, M. Modugno, and M. Inguscio, "Time-domain atom interferometry across the threshold for Bose-Einstein condensation," *Physical Review Letters*, vol. 87, p. 170 401, 2001. DOI: 10.1103/PhysRevLett.87.170401.

56 F. Minardi, C. Fort, **P. Maddaloni**, M. Modugno, and M. Inguscio, "Time-domain Ramsey interferometry with Bose-Einstein condensates," *Comptes Rendus de l'Academie des Sciences - Series IV: Physics, Astrophysics*, vol. 2, p. 605, 2001. DOI: 10.1016/S1296-2147(01)01197-0.

57 M. Modugno, C. Fort, **P. Maddaloni**, F. Minardi, and M. Inguscio, "Damping and frequency shift in the oscillations of two colliding Bose-Einstein condensates," *The European Physical Journal D - Atomic, Molecular, Optical and Plasma Physics*, vol. 17, p. 345, 2001. DOI: 10.1007/s100530170009.

58 P. Pedri, L. Pitaevskii, S. Stringari, C. Fort, S. Burger, F. S. Cataliotti, **P. Maddaloni**, F. Minardi, and M. Inguscio, "Expansion of a coherent array of bose-einstein condensates," *Physical Review Letters*, vol. 87, p. 220 401, 2001. DOI: 10.1103/PhysRevLett.87.220401.

59 **P. Maddaloni**, M. Modugno, C. Fort, F. Minardi, and M. Inguscio, "Collective oscillations of two colliding Bose-Einstein condensates," *Physical Review Letters*, vol. 85, p. 2413, 2000. DOI: 10.1103/PhysRevLett.85.2413.

60 M. Modugno, F. Dalfovo, C. Fort, **P. Maddaloni**, and F. Minardi, "Dynamics of two colliding Bose-Einstein condensates in an elongated magnetostatic trap," *Physical Review A - Atomic, Molecular, and Optical Physics*, vol. 62, p. 063 607, 2000. DOI: 10.1103/PhysRevA.62.063607.

Books

1 **P. Maddaloni**, M. Bellini, and P. De Natale, *Laser-based Measurements for Time and Frequency Domain Applications. A Handbook*. Taylor&Francis Group, 2013, ISBN: 978-1-4398-4151-8.

Book Chapters

1 M. Bellini, P. Cancio, G. Gagliardi, G. Giusfredi, **P. Maddaloni**, D. Mazzotti, and P. D. Natale, "Domain-engineered ferroelectric crystals for nonlinear and quantum optics," in *Ferroelectric crystals for photonic applications, vol. 91 of Series in Materials Science*, P. Ferraro, S. Grilli, and P. De Natale, Eds., Springer Berlin Heidelberg, 2014, pp. 285–311, ISBN: 978-3-642-41085-7.

2 M. D. Rosa, E. D. Tommasi, **P. Maddaloni**, S. Mosca, I. Ricciardi, A. Rocco, J.-J. Zondy, and P. De Natale, "Periodically-poled ferroelectric crystals based opo: A powerful source for precision spectroscopy," in *Ferroelectric crystals for photonic applications, vol. 91 of Series in Materials Science*, P. Ferraro, S. Grilli, and P. De Natale, Eds., Springer Berlin Heidelberg, 2014, pp. 453–473, ISBN: 978-3-642-41085-7.

3 M. Bellini, P. Cancio, G. Gagliardi, G. Giusfredi, **P. Maddaloni**, D. Mazzotti, and P. De Natale, "Domain-engineered ferroelectric crystals for nonlinear and quantum optics," in *Ferroelectric crystals for photonic applications, vol. 91 of Series in Materials Science*, P. Ferraro, S. Grilli, and P. De Natale, Eds., Springer Berlin Heidelberg, 2009, pp. 285–306, ISBN: 978-3-540-77963-6.

4 M. D. Rosa, G. Gagliardi, **P. Maddaloni**, P. Malara, A. Rocco, and P. D. Natale, "Laser-based in situ gas sensors for environmental monitoring," in *An introduction to optoelectronic sensors, vol. 7 of Series in Optics and Photonics*, G. Righini, A. Tajani, and A. Cutolo, Eds., World Scientific, 2009, pp. 468–493, ISBN: 978-981-283-412-6.

5 F. Minardi, C. Fort, **P. Maddaloni**, and M. Inguscio, "Multiple ^{87}Rb condensates and atom lasers by rf coupling," in *Bose-Einstein Condensates and Atom Lasers*, S. Martellucci, A. Chester, A. Aspect, and M. Inguscio, Eds., Kluwer Academic Publishers, 2002, pp. 129–140, ISBN: 0-306-46471-3.

6 M. Modugno, F. Dalfovo, C. Fort, M. Inguscio, **P. Maddaloni**, and F. Minardi, "Dynamics of two interacting Bose condensates in a magnetostatic trap," in *Atomic Physics 17, XVII International Conference on Atomic Physics (ICAP 2000), AIP Conference Proceedings 551*, E. Arimondo, P. De Natale, and M. Inguscio, Eds., American Institute of Physics, 2001, pp. 451–460, ISBN: 1-56396-982-3.

Conference Proceedings

1 R. Aiello, M. G. Delli Santi, V. Di Sarno, M. De Rosa, I. Ricciardi, P. De Natale, L. Santamaria, G. Giusfredi, and **P. Maddaloni**, "Lamb-dip ro-vibrational spectroscopy of buffer-gas-cooled acetylene," vol. 2439, 2023, p. 012 002. DOI: 10.1088/1742-6596/2439/1/012002.

Conference communications

Oral (invited)

2018 **Search for New Physics at The Electron-Volt Energy Scale by Precision Spectroscopy of Cold Molecules**, International congress: FIFTEENTH MARCEL GROSSMANN MEETING - MG15, Rome (Italy), July 1–7 (2018)

2015 **Exploring new fundamental physics by precision spectroscopy of cold molecules**, National congress: FOTONICA-2015 AEIT, Torino (Italy), May 6–8 (2015)

2011 **Unveiling the physics of molecules with comb-assisted coherent radiation sources**, International congress: 22ND COLLOQUIUM ON HIGH RESOLUTION MOLECULAR SPECTROSCOPY, Dijon (France), Aug 29 – Sept 2 (2011)

2006 **Mid-infrared difference-frequency optical combs for high-resolution spectroscopy**, International congress: 19TH CONFERENCE ON HIGH RESOLUTION MOLECULAR SPECTROSCOPY (HRMS-2006), Praha (Czech Republic), Aug 29 – Sept 2 (2006)

Oral (contributed)

2022 **Lamb-dip ro-vibrational spectroscopy of buffer-gas-cooled acetylene**, 25th International Conference on Spectral Line Shapes, Caserta (Italy), Jun 19–24 (2022)

2008 **Absolute frequency metrology of molecular spectra by a 3-μm laser directly linked to mid-infrared comb**, ELETTROOTTICA 2008, Milano (Italy), June 10–12

2007 **Mid-infrared optical frequency synthesizers for precision spectroscopy**, CLEO/IQEC 2007, Munich (Germany), June 17–22

A novel 3-micron frequency synthesizer, 2ND EOS TOPICAL MEETING ON OPTICAL MICROSYSTEMS (OμS 2007), Capri (Italy), Sept 30 – Oct 3

2006 **Trace gas monitoring around 3 micron by a difference frequency generator coupled to a high-finesse off-axis cavity**, ELETTROOTTICA 2006, Frascati (Italy), June 6–8

Conference communications (continued)

2005 **A 3.5-mW continuous-wave difference-frequency source around 3 micron for sub-Doppler molecular spectroscopy**, CLEO EUROPE-EQEC 2005, Munich (Germany), June 12–17

High-sensitivity spectroscopy of methane by means of a mW-power spectrometer around 3.3 micron: towards a portable MIR tunable spectrometer, MMD MEETING, Genova (Italy), June 22–25

2004 **High-sensitivity and high-resolution trace gas detection by means of a mW-power DFG spectrometer around 3.2 micron**, 49TH SPIE ANNUAL MEETING AND INTERNATIONAL SYMPOSIUM ON OPTICAL SCIENCE AND TECHNOLOGY, Denver (Colorado), August 2–6

Thickness measurement of thin transparent plates with a broad-band wavelength scanning interferometer, PHOTONICS EUROPE 2004, Strasbourg (France), April 26–30

Other contributions

In addition to personal oral contributions, PM has more than 50 conference communications and a dozen proceedings, overall.

Outreach

2022 **Percorsi per le competenze trasversali e l'orientamento (PCTO)**
President of the jury "A scuola di particelle: in viaggio verso la Fisica Moderna (V edizione)", Complesso Universitario di Monte Sant'Angelo (Napoli) 12/05/2022 (https://www.isasi.cnr.it/a-scuola-di-astroparticelle-2022). *Still in the PCTO context, PM is often an animator for his Institute in various types of dissemination initiatives (Notte Europea dei Ricercatori in Italia, Futuro Remoto, Festival della Scienza, Italian Quantum Weeks), and leads guided tours of the "Cold Molecules" Lab (at CNR-INO Naples) for secondary school students.*

2015 **Scientific dissemination for school groups**
Participation in the event "THE FRONTIERS OF LIGHT: JOURNEY TO DISCOVER EXTREME LIGHT" organized by the CNR on the occasion of the International Year of Light (IYL2015), with the speech "Light to measure the Universe: are the fundamental constants really constant?".

2014 **Article in media**
P. Maddaloni, M. Bellini, F. Levi, P. De Natale: Luce sul Tempo, Le Scienze (ed. italiana di Scientific American, issn=0036-8083), n. 546 (febbraio 2014), pp. 58-63. *Informative article on the state of the art of refined time and frequency measurements based on laser and atomic/molecular cooling technologies.*

Outreach (continued)

2013 **Appearance on TV**
Guest in the studio of the television program "SpaceLab", hosted by Marco Dedola on RaiNews24, in the episode "Catch the moment: the time of atomic clocks (0717213532DVB-TRaiNews)".

Interviews in national newspapers
Interviewed by Marco Pivato for the newspaper "La Stampa", Title of the article: *Let's synchronize the (atomic) clocks or the world will stop.*

Teaching and editorial roles

Scientific publishing

2017 – 2023 **Associate Editor for Optics Express (OPTICA PUBLISHING GROUP).**
Also referee for several scientific journals (Springer Nature, Science AASS, APS, IOP, RSC, OPTICA, Elsevier, Wiley, IEEE, . . .).

Thesis Supervision

2016 **Tesi di Dottorato in "Ingegneria dei Materiali e delle Strutture"**
Titolo: Comb-assisted high-sensitivity spectroscopy of molecular buffer gas cooled beams
Candidato: Valentina Di Sarno (XXVIII Ciclo)
Università degli Studi di Napoli "Federico II", Facoltà di Ingegneria (Dipartimento di Ingegneria Chimica, dei Materiali e della produzione Industriale)

2008 **Tesi di Laurea in "Ingegneria Biomedica"**
Titolo: Analisi dell'espirato umano per la diagnosi clinica precoce non invasiva: applicazione alla rivelazione di marcatori di patologie mediante spettrometro a generazione di frequenza differenza
Candidato: Flavio Naclerio (matr. 691/591)
Università degli Studi di Napoli "Federico II", Facoltà di Ingegneria (Dipartimento di Ingegneria Biomedica, Elettronica e Telecomunicazioni)

Organization of conferences

Member of the Organizing Committee - The International Quantum Cascade Lasers School and Workshop 2024, Ischia (Italy), August 25–30 (2024).

Member of the Organizing Committee - 25th International Conference on Spectral Line Shapes, Caserta (Italy), June 19–24 (2022).

Member of the Scientific Committee - CNR-INO Annual Symposium 2016, Sesto Fiorentino (Italia), Oct 27–28 (2016).

Teaching and editorial roles (continued)

- **Member of the Organizing Committee** - The 21st Colloquium on High Resolution Molecular Spectroscopy, Castellammare di Stabia (Italy), Aug 31 – Sept 4 (2009); Co-editor of the related Book of Abstract (ISBN 9788890436208).

Main appointments

2015–present
- **Manager of the Campania Node of the "National Optical Fiber Infrastructure for Time and Frequency Metrology"** established by the National Institute of Metrological Research (INRIM). *This fiber backbone provides an absolute frequency standard with superior accuracy and stability levels (i.e. the atomic cesium fountain operated by INRIM in Turin), to be used in the most challenging spectroscopic frequency measurements.*

2021–2022
- **Member of the Management Team of the Operational Agreement for the Planning and Monitoring of "Research Activities in the Quantum Technologies sector through the use of the respective research laboratories"** as established by CONVENZIONE OPERATIVA n. 2021-4-HH.0 ACCORDO QUADRO ASI (Agenzia Spaziale Italiana)/CNR n. 2018-6-Q.0.

2017–2021
- **Member of the CNR-INO Institute Council**
  Among other things, PM significantly contributed to the definition of the strategic research areas of CNR-INO, and to the restructuring of the institutional website.

Other skills and certifications

Languages
- **English**: Reading/Listening/Speaking=B2; Writing=C1.

Informatics
- Microsoft Office, Corel Draw, Wolfram Mathematica, Origin, LaTeX, GIMP, Blender, Overleaf, WordPress, Html.

Technical support
- PM often participates in examining boards for the assignment of research-scientist positions, routinely holds the role of RUP (Responsabile Unico del Procedimento per affidamento sotto soglia comunitaria).

2022
- **Attestato di Partecipazione al corso di Formazione "Problemi inerenti la salute e la sicurezza nei luoghi di lavoro"** Rep. n. 8754/2022, Soggetto organizzatore del corso: Unità di Prevenzione & Protezione del CNR e Unità di Formazione & Welfare del CNR, Evento n. 2022/16.

2021
- **Attestato di Partecipazione al corso di "Formazione aggiuntiva per preposti (aggiornamento)"** Rep. n. 6106/2021, Soggetto organizzatore del corso: Unità di Prevenzione & Protezione del CNR e Unità di Formazione & Welfare del CNR, Evento n. Evento n. 2021/15.

Other skills and certifications (continued)

2020 **Attestato di Partecipazione al corso di Formazione "Sicurezza Informatica (Base)"** Soggetto organizzatore del corso: Unità di Formazione dell'INFN, rilasciato il 04/06/2020.

2019 **Attestato di Partecipazione al corso di Formazione "Sicurezza Laser"** Rep. n. 5601/2019, Soggetto organizzatore del corso: Unità di Prevenzione & Protezione del CNR e Unità di Formazione & Welfare del CNR, Evento n. 2019/32.