

FRANCESCO CAPOZZI

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Università degli Studi dell'Aquila, Dipartimento di Scienze Fisiche e Chimiche, Via Vetoio 42, 67100 L'Aquila

ACADEMIC POSITIONS

Junior Researcher (RTDB), Università degli Studi dell'Aquila (Italy)	<i>07/2022 – Present</i>
Postdoctoral Researcher, Instituto de Fisica Corpuscular (Spain)	<i>11/2021 – 06/2022</i>
Postdoctoral Researcher, Virginia Tech (US)	<i>11/2020 – 10/2021</i>
Postdoctoral Researcher, Max Planck Institute For Physics (Germany)	<i>11/2017 – 10/2020</i>
Postdoctoral Researcher, Ohio State University (US)	<i>02/2017 – 10/2017</i>
Postdoctoral Researcher, Università degli Studi di Padova (Italy)	<i>01/2016 – 01/2017</i>
PhD Physics, Università degli studi di Bari (Italy) Advisors: Eligio Lisi and Antonio Marrone	<i>01/2013 – 12/2015</i>

EDUCATION

Master Degree in Theoretical Physics, Università degli studi di Bari Grade: 110/110 cum Laude	<i>10/2010 – 12/2012</i>
Bachelor Degree in Physics, Università degli studi di Bari Grade: 110/110 cum Laude	<i>09/2007 – 07/2010</i>

RESEARCH INTERESTS

Neutrino physics and astrophysics, astroparticle physics, axions, beyond standard model physics in neutrino experiments

LIST OF PUBLICATIONS

37. G. Lucente, N. Nath, F. Capozzi, M. Giannotti and A. Mirizzi,
“Probing high-energy solar axion flux with a large scintillation neutrino detector,”
Phys. Rev. D **106** (2022) no.12, 123007
36. S. Baum, F. Capozzi and S. Horiuchi,
“Rocks, water, and noble liquids: Unfolding the flavor contents of supernova neutrinos,”
Phys. Rev. D **106** (2022) no.12, 123008
35. F. Capozzi, M. Chakraborty, S. Chakraborty and M. Sen,
“Supernova fast flavor conversions in 1+1D: Influence of mu-tau neutrinos,”
Phys. Rev. D **106** (2022) no.8, 083011

34. O. Just, S. Abbar, M. R. Wu, I. Tamborra, H. T. Janka and F. Capozzi,
“Fast neutrino conversion in hydrodynamic simulations of neutrino-cooled accretion disks,”
Phys. Rev. D **105** (2022) no.8, 083024
33. F. Capozzi and N. Saviano,
“Neutrino Flavor Conversions in High-Density Astrophysical and Cosmological Environments,”
Universe **8** (2022) no.2, 94
32. S. Abbar and F. Capozzi,
“Suppression of fast neutrino flavor conversions occurring at large distances in core-collapse supernovae,”
JCAP **03** (2022) no.03, 051
31. F. Capozzi and S. T. Petcov,
“Neutrino tomography of the Earth with ORCA detector,”
Eur. Phys. J. C **82** (2022) no.5, 461
30. F. Capozzi, B. Dutta, G. Gungor, W. Jang, I. M. Shoemaker, A. Thompson and J. Yu,
“Extending the reach of leptophilic boson searches at DUNE and MiniBooNE with bremsstrahlung and resonant production,”
Phys. Rev. D **104** (2021) no.11, 115010
29. F. Schiavone, D. Montanino, A. Mirizzi and F. Capozzi,
“Axion-like particles from primordial black holes shining through the Universe,”
JCAP **08** (2021), 063
28. F. Capozzi, S. Abbar, R. Bollig and H. T. Janka,
“Fast neutrino flavor conversions in one-dimensional core-collapse supernova models with and without muon creation,”
Phys. Rev. D **103** (2021) no.6, 063013
27. S. Abbar, F. Capozzi, R. Glas, H. T. Janka and I. Tamborra,
“On the characteristics of fast neutrino flavor instabilities in three-dimensional core-collapse supernova models,”
Phys. Rev. D **103** (2021) no.6, 063033
26. F. Capozzi and G. Raffelt,
“Axion and neutrino red-giant bounds updated with geometric distance determinations,”
Phys. Rev. D **102** (2020) no.8, 083007
25. F. Capozzi, E. Di Valentino, E. Lisi, A. Marrone, A. Melchiorri and A. Palazzo,
“Unfinished fabric of the three neutrino paradigm,”
Phys. Rev. D **104** (2021) no.8, 083031
24. F. Capozzi, E. Lisi and A. Marrone,
“Mapping reactor neutrino spectra from TAO to JUNO,”
Phys. Rev. D **102** (2020), 056001
23. F. Capozzi, M. Chakraborty, S. Chakraborty and M. Sen,
“Fast flavor conversions in supernovae: the rise of mu-tau neutrinos,”
arXiv:2005.14204
22. F. Capozzi, E. Di Valentino, E. Lisi, A. Marrone, A. Melchiorri and A. Palazzo,
“Addendum to: Global constraints on absolute neutrino masses and their ordering,”
Phys. Rev. D **101** (2020), 116013
21. R. Glas, H.-T. Janka, F. Capozzi, M. Sen, B. Dasgupta, A. Mirizzi and G. Sigl,
“Fast Neutrino Flavor Instability in the Neutron-star Convection Layer of Three-dimensional Su-

- pernova Models,”
Phys. Rev. D 101 (2020) no.6, 063001
20. F. Capozzi, S. S. Chatterjee and A. Palazzo
“Neutrino mass ordering obscured by non-standard interactions”
Phys. Rev. Lett. 124 (2020) no.11, 111801
 19. F. Capozzi, G. Raffelt and T. Stirner
“Fast Neutrino Flavor Conversion: Collective Motion vs. Decoherence”
JCAP 1909 (2019) 002
 18. F. Capozzi, B. Dasgupta, A. Mirizzi, M. Sen and G. Sigl
“Collisional triggering of fast flavor conversions of supernova neutrinos”
Phys. Rev. Lett. 122 (2019) 091101
 17. F. Capozzi, S. W. Li, G. Zhu and J. F. Beacom
“DUNE as the Next-Generation Solar Neutrino Experiment”
Phys. Rev. Lett. 123 (2019) 131803
 16. S. Airen, F. Capozzi, S. Chakraborty, B. Dasgupta, G. Raffelt and T. Stirner
“Normal-mode Analysis for Collective Neutrino Oscillations”
JCAP 1812 (2018) 019
 15. F. Capozzi, B. Dasgupta and A. Mirizzi
“Model-independent diagnostic of self-induced spectral equalization versus ordinary matter effects in supernova neutrinos”
Phys. Rev. D 98 (2018) 063013
 14. F. Capozzi, E. Lisi, A. Marrone and A. Palazzo
“Current unknowns in the three neutrino framework”
Prog. Part. Nucl. Phys. 102 (2018) 48
 13. F. Capozzi, I. M. Shoemaker and L. Vecchi
“Neutrino Oscillations in Dark Backgrounds”
JCAP 1807 (2018) 004
 12. F. Capozzi, E. Lisi and A. Marrone
“Probing the neutrino mass ordering with KM3NeT-ORCA: Analysis and perspectives”
J. Phys. G 45 (2018) 024003
 11. F. Capozzi, B. Dasgupta, E. Lisi, A. Marrone and A. Mirizzi
“Fast flavor conversions of supernova neutrinos: Classifying instabilities via dispersion relations”
Phys. Rev. D 96 (2017) 043016
 10. F. Capozzi, E. Di Valentino, E. Lisi, A. Marrone, A. Melchiorri and A. Palazzo “Global constraints on absolute neutrino masses and their ordering”
Phys. Rev. D 95 (2017) 096014
 9. F. Capozzi, I. M. Shoemaker and L. Vecchi “Solar Neutrinos as a Probe of Dark Matter-Neutrino Interactions”
JCAP 1707 (2017) 021
 8. S. M. Bilenky, F. Capozzi and S. T. Petcov
“An Alternative Method of Determining the Neutrino Mass Ordering in Reactor Neutrino Experiments”
Phys. Lett. B 772 (2017) 179
 7. F. Capozzi, C. Giunti, M. Laveder and A. Palazzo
“Joint short- and longbaseline constraints on light sterile neutrinos”

- Phys. Rev. D 95 (2017) 033006
6. F. Capozzi, B. Dasgupta and A. Mirizzi
“Self-induced temporal instability from a neutrino antenna”
JCAP 1604 (2016) 043
 5. F. Capozzi, E. Lisi, A. Marrone, D. Montanino, and A. Palazzo
“Neutrino masses and mixings: Status of known and unknown parameters”
Nucl. Phys. B. 13623
 4. F. Capozzi, E. Lisi and A. Marrone
“Neutrino mass hierarchy and precision physics with medium-baseline reactors: Impact of energy-scale and flux-shape uncertainties”
Phys. Rev. D 92 (2015) 093011
 3. F. Capozzi, E. Lisi and A. Marrone
“PINGU and the neutrino mass hierarchy: Statistical and systematic aspects”
Phys. Rev. D 91 (2015) 073011
 2. F. Capozzi, G. L. Fogli, E. Lisi, A. Marrone, D. Montanino and A. Palazzo,
“Status of three-neutrino oscillation parameters, circa 2013”
Phys. Rev. D 89 (2014) 093018
 1. F. Capozzi, E. Lisi and A. Marrone
“Neutrino mass hierarchy and electron neutrino oscillation parameters with one hundred thousand reactor events,”
Phys. Rev. D 89 (2014) 013001

LIST OF TALKS AND SEMINARS

- Invited talk “MeV neutrino astronomy: challenges and opportunities”
Invisibles 2022 Workshop (Orsay, France) *June 2022*
- Contributed talk “Axion-like particles from primordial black holes shining through the Universe”
16th Iberian Cosmology Meeting (Barcelona, Spain) *May 2022*
- Contributed talk “Extending the Reach of Leptophilic Boson Searches at DUNE and MiniBooNE with Bremsstrahlung and Resonant Production”
FlipPhysics Workshop (Valencia, Spain) *March 2022*
- Invited webinar “Supernova Neutrinos: Current Challenges”
Indian Institute of Technology (Delhi) *September 2021*
- Invited talk “Fast flavor oscillations in 1D CCSN models with and without muon creation”
New Directions in Neutrino Flavor Evolution in Astrophysical Systems *September 2021*
- Invited talk “Up-to-date status of neutrino mass and mixing parameters”
107 Congresso Nazionale della Società Italiana di Fisica *September 2021*
- Invited talk “Supernova Neutrinos in the Standard Model”
First EuCAPT Annual Symposium *May 2021*

Invited webinar “Axion and neutrino bounds improved with new calibrations of the tip of the red-giant branch using geometric distance determinations”
Northwestern University *March 2021*

Invited webinar on “Axion and neutrino red-giant bounds updated with geometric distance determinations”
Virtual Axion Institute *July 2020*

Invited colloquium on “Frontiers in Neutrino Oscillations: Precision and New Phenomena”
Colorado State University (Fort Collins, Colorado) *January 2020*

Invited talk on “Status of 3-neutrino mass-mixing parameters”
International Conference on Neutrinos and Dark Matter (Hurghada, Egypt) *January 2020*

Invited seminar on “Frontiers in Neutrino Oscillations: Precision and New Phenomena”
SISSA (Trieste, Italy) *November 2019*

Invited talk on “Current status of neutrino mass-mixing parameters”
GDR Neutrino meeting (Bordeaux, France) *October 2019*

Invited talk on “Supernova Neutrinos”
Neutrino Platform Week (CERN, Geneva) *October 2019*

Invited talk on “Current status of neutrino mass-mixing parameters”
39th International Symposium on Physics in Collisions (Taipei, Taiwan) *September 2019*

Invited talk on “Current status of neutrino mass-mixing parameters”
19th Lomonosov Conference on Elementary Particle Physics (Moscow, Russia) *August 2019*

Invited seminar on “Neutrino oscillations in dark background”
Tata Institute of Fundamental Research (Mumbai, India) *February 2019*

Invited seminar on “Status of three-neutrino mass-mixing parameters”
Indian Institute of Technology (Guwahati, India) *February 2019*

Invited talk on “Solar neutrino: status and prospects”
NuPhys 2018 (London, UK) *December 2018*

Invited seminar on “DUNE as the next generation solar neutrino experiment”
Instituto de Física Corpuscular (Valencia, Spain) *November 2018*

Invited talk on “DUNE as the next generation solar neutrino experiment”
GDR Neutrino meeting (Strasbourg, France) *November 2018*

- Contributed talk on “Distinguishing $SN\nu$ equalization from a pure MSW effect”
Neutrino Oscillation Workshop (Ostuni, Italy) *September 2018*
- Invited talk on “Neutrino oscillations in dark backgrounds”
Advanced Workshop on Physics of Atmospheric Neutrinos (Trieste, Italy) *May 2018*
- Invited seminar on “DUNE as the next generation solar neutrino experiment”
Tata Institute of Fundamental Research (Mumbai, India) *February 2018*
- Invited talk on “Current unknowns in neutrino physics”
Nu Horizons 2018 (Allahabad, India) *February 2018*
- Invited talk on “Global Analysis of Neutrino Mixing Parameters: Recent results and prospects”
Workshop on Next generation Nucleon Decay and Neutrino Detectors (Warwick, UK) *October 2017*
- Contributed talk on “Fast neutrino flavour conversion near the supernova core”
TeV Particle Astrophysics Conference (Columbus, US) *August 2017*
- Contributed talk on “Solar Neutrinos as a Probe of Dark Matter-Neutrino Interactions”
New Directions in Dark Matter and Neutrino Physics (Waterloo, Canada) *July 2017*
- Invited seminar on “DUNE as the next generation solar neutrino experiment” Ohio State University
(Columbus, US) *July 2017*
- Invited seminar on “Solar Neutrinos as a Probe of Dark Matter-Neutrino Interactions”
Fermilab (Chicago, US) *July 2017*
- Contributed talk on “Solar Neutrinos as a Probe of Dark Matter-Neutrino Interactions”
International Workshop on Baryon and Lepton Number Violation (Cleveland, US) *May 2017*
- Contributed talk on “Solar Neutrinos as a Probe of Dark Matter-Neutrino Interactions”
IceCube Particle Astrophysics Symposium (Madison, US) *May 2017*
- Contributed talk on “CP violation from light sterile neutrinos in long baseline oscillations”
Precision Investigations of the Neutrino Sector (SLAC, US) *March 2017*
- Invited seminar on “Neutrino flavour conversions in supernova: recent developments”
Ohio State University (Columbus, US) *November 2016*
- Contributed talk on “Status of three-neutrino mixing”
Neutrino Oscillation Workshop (Otranto, Italy) *September 2016*
- Contributed talk on “Self-induced temporal instability from a neutrino antenna”
Planck Conference (Valencia, Spain) *May 2016*

Contributed talk on “Phenomenology of neutrino masses and mixings”
Meeting of the Italian “Theoretical Astroparticle Physics Project” (Turin, Italy) *July 2015*

Contributed talk on “PINGU and the mass hierarchy: statistical and systematical aspects”
Incontri di Fisica delle alte energie (Rome, Italy) *April 2015*

Invited seminar on “Current bounds on neutrino oscillation parameters and future prospects with medium baseline reactor oscillations”, DESY (Hamburg, Germany) *May 2014*

Contributed talk on “Probing mass hierarchy in reactor neutrino oscillations”
Moriond: Electroweak Interactions and Unified Theories (La Thuile, Italy) *March 2014*

TEACHING

Co-supervisor of a summer master student, leading to a publication in JCAP *May – July 2018*

Teaching assistant, physics laboratory course, University of Bari *Spring 2015*

Course of Astrophysics for the master degree in Physics at Università degli Studi dell’Aquila *2023 – Present*

Course of Introduction to Nuclear Physics for the bachelor degree in Physics at Università degli Studi dell’Aquila *2023 – Present*

Course of General Physics for the bachelor degree in Industrial Engineering at Università degli Studi dell’Aquila *2023 – Present*

Supervisor of one bachelor thesis in Physics at Università degli Studi dell’Aquila *2022 – Present*

GRANTS AWARDED

Neutrino Physics Center Fellowship at Fermilab 2016

4-years senior postdoctoral position funded by the Generalitat Valenciana (CDEIGENT 2020) from 2021 to 2025

PROFESSIONAL SERVICE

Referee for Journal of Cosmology and Astroparticle Physics, Physical Review Letters, Physics Letters B, Physical Review D, Nuclear Physics B

CONFERENCE COMMITTEES

Member of the local committee, Invisibles Workshop (Padova, Italy) *12 – 16 September 2016*

LOCAL RESPONSABILITIES

Astroparticle physics seminars organizer, Max Planck Institute for Physics *02/2018 – 10/2020*

LANGUAGES

Italian – Mother tongue

English – Level C2

German – Level A1

Spanish – Level B1