Francesco Di Filippo

PhD Astroparticle Physics

Highlights

Fellowships and Awards: MSCA fellowship, FCT Fellowship (declined), Humboldt Fellowship, JSPS fellowship; Václav Votruba Prize, fifth prize 2024 Awards for Essays on Gravitation by the Gravity Research Foundation Awards. **Total ~ € 530.000**.
Strong Publication Record: Author of 38 publications in high-impact journals, total citations: 2000 and h-index: 21.
Event Organizer: Organizer of multiple events and workshops, including serving as the lead organizer for the inaugural edition of the Black Holes Inside and Out conference series, held online in 2021.
Invited Speaker and Panellist: Invited speaker at 10 international conferences or workshops, selected plenary speaker at 1 international conference, invited panellist at 2 panel discussions, and invited to deliver several seminars in world-leading institutes.

Academic positions

2025 – to date Humboldt Postdoctoral fellow at the Goethe University, Frankfurt, Germany.

2023 – 2025 Postdoctoral researcher at the Institute for Theoretical Physics, Charles University, Prague, Czechia.

2020 – 2023 JSPS postdoctoral researcher at the Yukawa Institute for Theoretical Physics, Kyoto, Japan.

Education

2020 PhD in Astroparticle physics *cum laude,* SISSA International School for Advanced Studies, Trieste, Italy. Supervisor Prof. Stefano Liberati.

2016 Master's degree in physics with focus on Theoretical Physics *cum laude*, University of Salerno, Italy. Supervisors Prof. Carlos Barceló and Prof. Gaetano Lambiase.

Fellowships and Awards

2025 Awarded the competitive MSCA postdoctoral fellowship. Approval rate ~15% (Fellowship accepted but not started yet) (~€ 200.000).

2025 Offered the competitive FCT fellowship. Approval rate ~14.6% (declined) (~€ 160.000).

2024 Awarded the competitive Humboldt fellowship (to be started in February 2025) (~€ 90.000).

2024 Fifth prize in the 2024 Awards for Essays on Gravitation by the Gravity Research Foundation. Co-writer of the essay "*Fully Extremal Black Holes: A Black Hole Graveyard?*" (Prize ~ $ 400).

2021 Winner of the Václav Votruba Prize for the best thesis in theoretical physics (Prize ~ € 2.000).

2021 KAKENHI Grant-in-aid for scientific research (Co-Investigator). (~ € 11.000).

2021 Awarded the competitive JSPS postdoctoral fellowship (~€ 70.000).

2021 Honorable Mention in the 2021 Awards for Essays on Gravitation by the Gravity Research Foundation. Co-writer of the essay "*Hearts of Darkness: the inside out probing of black holes*".

Event organization

11/2024 Organizer of the workshop “Towards a non-singular paradigm of Black Hole Physics” at IFPU in Trieste, Italy.

08/2024 Organizer of the “Black Holes Inside and Out 2024” conference at the Niels Bohr Institute in Copenhagen, Denmark.

08/2024 Member of the local organizing committee of the 14th conference on Relativistic Quantum Information in Prague, Czech Republic.

02/2024 Member of the local organizing committee of the PhD school “Measuring gravity”, Vietri sul mare (SA), Italy.

07/2023 Organizer of “Gravity 2023: dawn of field theoretic approaches” in Kyoto, Japan.

06/2022 Organizer of the conference “Gravity: Current challenges in black holes physics and cosmology” in Kyoto, Japan.

02/2022 Member of the local organizing committee for the YITP long-term workshop “Gravity and Cosmology 2024” Kyoto, Japan.

09/2021 Organizer of the “Black Holes Inside and Out 2021” online international conference.

03/2021 Member of the advisory board for the “Quantum Gravity, Higher Derivatives and Nonlocality”

Habilitations for professorship

National Scientific Habilitation (“Abilitazione scientifica Nazionale”) for the position of Associate Professor in Theoretical Physics "Settore 02/A2" (08/06/2023– present). This qualification certifies that an individual possess all the requirements to be an associate professor in Italy.

Teaching experience

2025 Invited lecturer of an intensive course ``Advanced Topics in Black Hole Physics” held at the Institute for Basic Science in Daejeon, South Korea in November 2025.

2024 Invited lecturer on quantum black holes, at the summer school *“Towards Quantum Gravity”* in August 2024.

2015 - 2016 Teaching assistant for the Classical Mechanics course for first-year undergraduate physics students at the University of Salerno.

Supervision experience

2025 Co-supervisor (informal due to the Postdoc status) together with Prof. Luciano Rezzolla of the graduate student Daniel Jamplowski at the Goethe University, Frankfurt, Germany.

2022 Co-supervisor (informal due to the Postdoc status) together with Prof. Shinji Mukohyama of the master thesis of Takahiro Waki at the YITP, Kyoto University.

Referee activity for journals

Referee for several journals in the field, including Physical Review Letters, JCAP, Physical Review D, Physical Letters B, EPJC

Oral Presentations

23/9/2025 **Invited talk** at the conference *“Crossroads in Strong Gravity”,* in Catania, Italy.
Towards a Non-singular Paradigm for Black Holes

27/06/2025 **Invited talk** at the conference *"From Puzzles to New Insights in Fundamental Physics"* in Campagna (SA), Italy.
Towards a Non-singular Paradigm for Black Holes

8/04/2025 **Invited talk** at the "Prague Spring 2025: CAS - IBS CTPU-CGA - ISCT Workshop in Cosmology, Gravitation and Particle Physics", in Prague, Czechia.
Towards a non-singular paradigm for black hole physics

12/12/2024 Talk at the "5th EPS Conference on Gravitation", in Prague, Czechia.
Open issues in the construction of non-singular black holes

18/10/2024 **Invited talk** at the "CAS-IBS CTPU-CGA-Tokyo Tech 2024 Workshop", in Toyohashi, Japan.
The end-point of gravitational collapse: Black holes or else?

06/08/2024 Talk at the "14th annual conference on Relativistic Quantum Information (North)", in Prague, Czechia.
Open issues in the construction of non-singular black holes

23/10/2023 **Invited talk** at the conference "Puzzles in the Quantum Gravity Landscape: viewpoints from different approaches" at Perimeter Institute, Waterloo, Canada.
Hearts of Darkness: Nonsingular Black Holes Beyond General Relativity

09/02/2023 **Invited talk** at the seminar series "Quantum Gravity and All of That", Online.
Hearts of Darkness: theory and phenomenology of non-singular black holes.

01/09/2022 **Selected plenary talk** at the "Spanish and Portuguese relativity meeting (EREP) 2022", Salamanca, Spain.
Viable regular black holes.

03/08/2021 **Invited talk** at the Copernicus Webinar and Colloquium Series, online.
On the assumptions leading to the information loss paradox.

03/08/2021 **Invited talk** at the conference "Cosmology and Quantum Space Time", Seoul, South Korea.
On the assumptions leading to the information loss problem.

28/04/2021 **Invited talk** at the conference "The Quantum and The Gravity", Online.
Geodesically complete black holes: Possibilities and implications.

20/12/2019 Talk at the XII Black Holes Workshop, Guimarães, Portugal.
Geodesically complete black holes.

13/11/2019 **Invited talk** at "Autumn workshop on gravity and cosmology", Warsaw, Poland.
On the uniqueness of general relativity.

10/07/2019 GR-22, Amaldi-13, Valencia, Spain.
Singularity Avoidance: Possibilities and Implications.

25/06/2019 Talk at the conference ASTRO@TS, IFPU Trieste, Italy.
Phenomenology of non-singular black holes.

20/02/2019 Poster presentation at the EPS Conference on Gravitation, Roma, Italy
On the viability of regular black holes beyond general relativity.

28/06/2018 Talk at the conference "Open problem in theoretical physics (PAFT)", Vietri sul mare (SA), Italy.
Minimally modified theories of gravity: a playground for testing the uniqueness of general relativity.

15/09/2018 Talk at the SIGRAV 2018 conference. Santa margherita di Pula Italy.
On the viability of regular black holes.

18/07/2018 Poster presentation at the Tri-Institute Summer School on Elementary Particles, Perimeter Institute, Waterloo, Canada. *Testing the uniqueness of general relativity.*

Panel discussions

26/10/2023 Invited panellist at the *black holes puzzles* panel during the conference "Puzzles in the Quantum Gravity Landscape: viewpoints from different approaches" at Perimeter Institute, Waterloo, Canada.

24/10/2023 Invited panellist at the *pizza & career* panel for young researcher during the conference "Puzzles in the Quantum Gravity Landscape: viewpoints from different approaches" at Perimeter Institute, Waterloo, Canada.

Citation metrics (according to the Inspire database, as of December 19th 2025.)

Publications: 38; Citations: 2037; H-index:21 (Including large collaboration papers)

Publications: 35; Citations: 1513; H-index:20 (Excluding large collaboration papers)

Invited Seminars

04/12/2025 Heidelberg University, Germany. Host: Prof. Astrid Eichhorn

31/10/2025 Centre for Theoretical Cosmology offers DAMPT, Cambridge, UK. Host: Dr. Daniela Cors

15/10/2025 Niels Bohr Institute, Copenhagen, Denmark. Host: Prof Alessia Platania

20/11/2024 Radboud University Nijmegen, Netherlands. Host: Dr. Luca Buoninfante

13/10/2024 YITP Kyoto University, Japan. Host: Shinji Mukohyama

14/05/2024 University of Trento, Italy. Host: Prof Massimiliano Rinaldi

03/03/2024 University of Barcelona, Spain. Host: Dr. Mohammed Ali Gorji

28/02/2024 Institute of Theoretical Physics, Frankfurt University, Germany Host: Prof. Luciano Rezzolla

21/11/2023 CEICO Institute, Prague, Czech Republic. Host: Prof. Alex Vikman

08/02/2023 Johns Hopkins University, Baltimore, USA. Host: Prof. Emanuele Berti

01/02/2023 Cornell University, Ithaca, USA. Host: Prof. Thomas Hartman

08/09/2022 Cagliari University, Italy. Host: Prof. Mariano Cadoni

14/10/2021 Tokyo Institute of Technology, Tokyo, Japan. Host: Prof. Masahide Yamaguchi

14/10/2021 Perimeter Institute, Waterloo, Canada.

28/07/2021 University of Rome La Sapienza, Italy. Host: Prof. Paolo Pani

27/05/2021 University of Groningen, Netherlands. Host: Prof. Anupam Mazumbdar

08/10/2019 University of Nottingham, UK.Host: Prof. Thomas Sotiriou

01/10/2019 University of Nottingham, UK. Host: Prof. Thomas Sotiriou

04/12/2018 University of Salamanca, Spain. Host: Prof. Jose Beltrán Jiménez

Papers (All papers are in alphabetical order)

[27] L. Buoninfante, F. Di Filippo, I. Kolář, F. Saueressig,
Dust collapse and horizon formation in Quadratic Gravity
JCAP 01 (2025) 114

[26] F. Di Filippo, L. Rezzolla,
Can light rings self-gravitate?
Phys. Rev. D 111, L021504

[25] F. Di Filippo, S. Liberati, M. Visser,
Fully Extremal Black Holes: A Black Hole Graveyard.
International Journal of Modern Physics 10.1142/S0218271824400054

[24] F. Di Filippo,
The nature of inner light-rings.
Phys.Rev.D 110 (2024) 8, 084026.

[23] Francesco Di Filippo, Ivan Kolář, David Kubiznak,
Inner-extremal regular black holes from pure gravity.
Phys.Rev.D 111 (2025) 4, L041505.

[22] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Mass inflation without Cauchy horizons.
Phys.Rev.Lett. 133 (2024) 18, 181402

[21] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Constraints on thermalizing surfaces from infrared observations of supermassive black holes.
JCAP 11 (2023) 041.

[20] F. Di Filippo, N. Ogawa, S. Mukohyama, Takahiro Waki,
Soft hair, dressed coordinates, and information loss paradox.
Phys.Rev.D 108 (2023) 4, 044034

[19] R. Carballo-Rubio, F. Di Filippo, S. Liberati, C. Pacilio, M. Visser,
Comment on "Stability properties of Regular Black Holes".
Phys.Rev.D 108 (2023) 12, 128501.

[18] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
A connection between regular black holes and horizonless ultracompact stars.
JHEP 08 (2023) 046

[17] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Constraints on horizonless objects after the EHT observation of Sagittarius A.*
JCAP 08 (2022) 08, 055.

[16] R. Carballo-Rubio, F. Di Filippo, S. Liberati, C. Pacilio, M. Visser,
Regular black holes without mass inflation instability.
JHEP 09 (2022) 118.

[15] E. Berti, V. Cardoso, M.H.Y. Cheung, F. Di Filippo, F. Duque, P. Martens, S. Mukohyama,
Stability of the fundamental quasinormal mode in time-domain observations against small perturbations.
Phys.Rev.D 106 (2022) 8, 084011.

[14] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Geodesically complete black holes in Lorentz-violating gravity.
JHEP 02 (2022) 122.

[13] L. Buoninfante, Francesco Di Filippo, S. Mukohyama.
On the assumptions leading to the information loss paradox.
JHEP 10 (2021) 081.

[12] R. Carballo-Rubio, F. Di Filippo, S. Liberati,
Hearts of Darkness: the inside out probing of black holes.
Int.J.Mod.Phys.D 30 (2021) 14, 2142024.

[11] K. Aoki, F. Di Filippo, S. Mukohyama,
Non-uniqueness of massless transverse-traceless graviton.
JCAP 05 (2021) 071.

[10] R. Carballo-Rubio, F. Di Filippo, S. Liberati, C. Pacilio M. Visser,
Inner horizon instability and the unstable cores of regular black holes.
JHEP 05 (2021) 132.

[9] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Causal hierarchy in modified gravity.
JHEP 12 (2020) 055.

[8] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Geodesically complete black holes.
Phys.Rev.D 101 (2020) 084047.

[7] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Opening the Pandora's box at the core of black holes.
Class.Quant.Grav. 37 (2020) 14, 14.

[6] R. Carballo-Rubio, F. Di Filippo, N. Moynihan,
Taming higher-derivative interactions and bootstrapping gravity with soft theorems.
JCAP 1910 (2019) 030.

[5] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Phenomenological aspects of black holes beyond general relativity.
Phys. Rev., D98, 124009 (2018).

[4] R. Carballo-Rubio, F. Di Filippo, S. Liberati, C. Pacilio, M. Visser,
On the viability of regular black holes.
JHEP 1807 023 (2018).

[3] R. Carballo-Rubio, F. Di Filippo, S. Liberati,
Minimally modified theories of gravity: a playground for testing the uniqueness of general relativity.
JCAP 1806 no.06, 026, (2018).

[2] C. Barceló, R. Carballo-Rubio, F. Di Filippo, L. J. Garay,
From physical symmetries to emergent gauge symmetries.
JHEP 1610 084 (2016).

[1] F. Di Filippo, C. Noce,
Exact Electronic Bands for a Periodic Pöschl--Teller Potential.
Commun.Theor.Phys. 66 no.5, (2016).

Chapter in book (Alphabetic order)

[CB1] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser,
Singularity-free gravitational collapse: From regular black holes to horizonless objects.
Part of the book: *Regular Black Holes Towards a New Paradigm of Gravitational Collapse.*
Editor C. Bambi.

Conference report (Speaker first)

[CR1] F. Di Filippo, R. Carballo-Rubio, S. Liberati, C. Pacilio, M. Visser,
On the Inner Horizon Instability of Non-Singular Black Holes.
Int.J.Mod.Phys.D 30 (2021) 14, 2142024.

Lecture notes (Alphabetic order)

[LN1] Ivano Basile, Luca Buoninfante, Francesco Di Filippo, Benjamin Knorr, Alessia Platania, Anna Tokareva,
Lectures in Quantum gravity.
Arxiv 2412.08690.

Large collaboration paper

[LC3] R. Carballo-Rubio, F. Di Filippo, S. Liberati, M. Visser, et al.
Towards a Non-singular Paradigm of Black Hole Physics
ArXiv: 2501.05505. To be published in JCAP.

[LC2] Editors: Luca Buoninfante, Raúl Carballo-Rubio, Vitor Cardoso, Francesco Di Filippo, Astrid Eichhorn,
Black Holes Inside and Out 2024: visions for the future of black hole physics
ArXiv: 2410.14414

[LC1] E. Barausse et al.,
Prospects for fundamental physics with LISA
General Relativity and Gravitation 52 (8), 1-33