

NEWSLETTER N.5, March 2025



*Musicians at the Quantum Café. Trieste, February 2025.*

## Index

|                                       |   |
|---------------------------------------|---|
| <b>Update of work done</b> .....      | 3 |
| <b>Publications</b> .....             | 4 |
| <b>Dissemination activities</b> ..... | 5 |

## Update of work done

### Angelo Bassi Discusses the Foundations of Quantum Mechanics on Sky TG24's "Science, please" Podcast

In a recent episode of *Science, please*, the Sky TG24 podcast that explores major scientific questions, Angelo Bassi was invited to discuss the foundations of quantum mechanics and the challenges it presents.

The conversation focused on the measurement problem, which questions how and when quantum systems transition from a superposition of states to a definite outcome. He explained the implications of Schrödinger's cat paradox, using it as a key example to illustrate the counterintuitive nature of quantum reality. The discussion also covered different interpretations of quantum mechanics, from the Copenhagen interpretation to more modern perspectives

The full episode is available for streaming on [Spotify](#).

### Quantum Café in Trieste

After the success of the first editions of the Quantum Café in 2018 and 2019, UniTs organizes a new round of dissemination events in the frame of the QuCoM project to share with the general public new and exciting discoveries in physics.

For this edition, the Quantum Café proposed as topic the Universe. The first event (February 12<sup>th</sup>, 2025) offered an overview of the observed Universe, the distances, black holes and the current astrophysical open issues (prof. Alexandro Saro). The second date will present the growing sector of the space economy and the instrumentation used to observe the universe; the third event will explore the origins of the Universe and explains how quantum mechanics describes the first instants of the Universe.



With the aim of offering an interdisciplinary dissemination event, the Quantum Café offers moments of theater readings of contemporary classics and live music performed by the students of the Physics Department of the University of Trieste.

## Publications

| Authors  | Title   | Journal                        | Volume | Pages  | Year |
|--|---|--------------------------------|--------|--------|------|
| Timberlake, Chris; Simcox, Elliot; Ulbricht, Hendrik   | Linear cooling of a levitated micromagnetic cylinder by vibration                               | <i>Phys. Rev. Research</i>     | 6      | 033345 | 2024 |
| Vischi, Michele; Bartolomeo, Giovanni Di; Proietti, Massimiliano; Koudia, Seid; Cerocchi, Filippo; Dispenza, Massimiliano; Bassi, Angelo | Simulating photonic devices with noisy optical elements   | <i>Phys. Rev. Research</i>     | 6      | 033337 | 2024 |
| Hanif, Farhan; Das, Debarshi; Halliwell, Jonathan; Home, Dipankar; Mazumdar, Anupam; Ulbricht, Hendrik; Bose, Sougato                    | Testing Whether Gravity Acts as a Quantum Entity When Measured                                  | <i>Phys. Rev. Lett.</i>        | 133    | 180201 | 2024 |
| Cizak, Marzena; Belenchia, Alessio; Ortolan, Antonello; Marino, Francesco  | Quantum gravity inspired nonlocal quantum dynamics preserving the classical limit               | <i>Class. Quantum Grav.</i>    | 41     | 205003 | 2024 |
| Figurato, Laria; Dirindin, Marco; Gaona-Reyes, José Luis; Carlesso, Matteo; Bassi, Angelo; Donadi, Sandro                                | On the effectiveness of the collapse in the Diósi–Penrose model                                 | <i>New J. Phys.</i>            | 26     | 113004 | 2024 |
| Lenler-Eriksen, Emil; Drewsen, Michael; Carlesso, Matteo   | Testing continuous spontaneous localization model with charged macromolecules                   | <i>New J. Phys.</i>            | 26     | 113008 | 2024 |
| Hernández-Gómez, Santiago; Isogawa, Takuya; Belenchia, Alessio; Levy, Amikam; Fabbri, Nicole; Gherardini, Stefano; Cappellaro, Paola     | Interferometry of quantum correlation functions to access quasiprobability distribution of work | <i>npj Quantum Information</i> | 10     | 115    | 2024 |

|  |   |                                  |     |        |      |
|--|---|----------------------------------|-----|--------|------|
| Bartolomeo, Giovanni Di;<br>Vischi, Michele; Feri,<br>Tommaso; Bassi, Angelo;<br>Donadi, Sandro  | Efficient quantum algorithm to<br>simulate open systems through<br>a single environmental qubit                 | <i>Phys. Rev.<br/>Research</i>   | 6   | 043321 | 2024 |
| Gundhi, Anirudh  | Decoherence due to the<br>Casimir effect?   | <i>Phys. Rev. D</i>              | 110 | 116001 | 2024 |
| Braidotti, M. C.; Vinante, A.;<br>Cromb, M.; Sandakumar, A.;<br>Faccio, D.; Ulbricht, H.         | Amplification of<br>electromagnetic fields by a<br>rotating body  | <i>Nat<br/>Commun</i>            | 15  |        | 2024 |
| Crognaletti, Giulio;<br>Bartolomeo, Giovanni Di;<br>Vischi, Michele; Viteritti,<br>Luciano Loris | Equivariant Variational<br>Quantum Eigensolver to detect<br>phase transitions through<br>energy level crossings | <i>Quantum<br/>Sci. Technol.</i> | 10  | 015048 | 2024 |

## Dissemination activities

In the last 6 months, QuCoM members delivered seminars and talks as follows.

### September 2024 – February 2025

#### Quantum Physics in rotating frames

10/09/24

Event: Fundamental Problems in Quantum Physics Speaker: Marion Cromb  
Place: University of Trieste Date: 10 September 2024

#### Are there quantum jumps?

10/09/24

Event: Fundamental Problems in Quantum Physics 2024 Speaker: Angelo Bassi  
Place: University of Trieste Date: 10 September 2024

#### Large-mass quantum systems I & II

02/09/24

Event: VCQ summer school on Interfacing Gravity and Quantum Physics  
Speaker: Hendrik Ulbricht Place: Vienna Date: 2 September 2024

#### Noisy gates for simulating quantum computers

10/09/24

Event: Qtech2024 Quantum Technology International Conference Speaker:  
Michele Vischi Place: Freie Universität Berlin Date: 10 September 2024

#### Enhancing the deviations from Quantum Mechanics due to Schrödinger–Newton dynamics

09/09/24

Event: QuCom Meeting Trieste 2024 Speaker: Davide Giordano Ario Altamura  
Place: University of Trieste Date: 9 September 2024

#### Levitated mechanics, Acceleration & Free Fall

19/08/24

Event: LeviNet – Zhejiang joint conference on Optical Tweezers in Vacuum  
Speaker: Hendrik Ulbricht Place: Hangzhou, China Date: 19 August 2024

## Testing quantum mechanics and gravity by using levitated mechanics

16/09/24

Event: Spacetime – Matter – Quantum Mechanics (DICE2024) Speaker: Hendrik Ulbricht Place: Castiglioncello, Italy Date: 16 September 2024

## Non-interferometric rotational test of the Continuous Spontaneous Localisation model

12/09/24

Event: Fundamental Problems in Quantum Physics 2024 Speaker: Davide Giordano Ario Altamura Place: University of Trieste Date: 12 September 2024

## Can we incorporate spontaneous collapse in the Wheeler–DeWitt equation?

11/09/24

Event: Fundamental problems in Quantum Physics Speaker: José Luis Gaona Reyes Place: University of Trieste Date: 11 September 2024

## Large-mass quantum systems for testing the overlap between quantum mechanics and gravity

23/09/24

Event: ICTP–SAFIR workshop on Witnessing Quantum Aspects of Gravity in a Lab Speaker: Hendrik Ulbricht Place: Sao Paulo, Brazil Date: 23 September 2024

## Collapse models: experimental tests and future developments

25/10/24

Event: Quantum Optics, Gravity, and Collapse: Charting New Phenomenological Horizons Speaker: Angelo Bassi Place: Centro Fermi, Rome Date: 25 October 2024

## Heisenberg’s uncertainty principle

28/11/24

Event: Seminar Speaker: Angelo Bassi Place: "Collegio Fonda", Trieste Date: 28 November 2024

## Computer quantistici: potenziali e limiti

14/11/24

Event: Come sarà il mondo di domani? Speaker: Angelo Bassi Place: University of Trieste, Trieste Date: 14 November 2024

## Ways to test the quantum nature of gravity

28/01/25

Event: Quantum West Speaker: Angelo Bassi Place: San Francisco Date: 28 January 2025

## Are there quantum jumps?

12/09/24

Event: The Novel Puzzles of Quantum Mechanics Speaker: Angelo Bassi Place: University of Trento Date: 12 September 2024

## Large-mass quantum systems

11/09/24

Event: Fundamental Problems in Quantum Physics Speaker: Hendrik Ulbricht Place: Trieste Date: 11 September 2024

## Magnetic Levitation: A platform for testing fundamental physics

10/09/24

Event: Fundamental Problems in Quantum Physics Speaker: Chris Timberlake Place: University of Trieste Date: 10 September 2024

## Modifying the Wheeler–DeWitt equation through a collapse mechanism

20/09/24

Event: Eleventh International Workshop DICE2024 Speaker: José Luis Gaona Reyes Place: Castiglioncello, Italy Date: 20 September 2024

## Meccanica Quantistica: alla ricerca di un’immagine del mondo

17/10/24

Event: Come sarà il mondo di domani? Un viaggio tra scienza e filosofia aperto a tutti tra i meandri della meccanica quantistica Speaker: Angelo Bassi Place: Università di Trieste Date: 17 October 2024

## Le tecnologie quantistiche nella Regione Friuli Venezia Giulia

21/11/24

Event: Qiskit Fall Fest Speaker: Angelo Bassi Place: University of Trieste, Trieste Date: 21 November 2024

## Cybersecurity del Futuro: La Rivoluzione della Comunicazione Quantistica

10/11/24

Event: Focus Live 2024 Speaker: Angelo Bassi Place: Focus Live, Milano Date: 10 November 2024

## Il Mondo dei Quanti

20/12/24

Event: Seminar Speaker: Angelo Bassi Place: Liceo «A. Messedaglia», Verona Date: 20 December 2024