

## Program of the Workshop:

### **The Hitchhiker's Advanced Guide to Quantum Collapse Models and their impact in science, philosophy, technology and biology**

**31 October – 4 November 2022, LNF-INFN, Frascati**

The Conference will be held in **Aula Touschek**, at the **Laboratori Nazionali di Frascati - INFN** in the days **31 October, 2-4 November 2022** (hybrid format: in presence and online)

On **1<sup>st</sup> November** there will be a **Special Event** in **Frascati town** in the **Town Hall (Comune di Frascati)**, **Sala degli Specchi** (only in presence) – round table and discussions

The zoom link for online participation:

<https://infn-it.zoom.us/j/82907992898>

#### **31<sup>st</sup> October 2022**

*Chair: Alessandro Scordo*

9:45 – 10:15 **Registration**

10:15 – 10:30 **Welcome** (Catalina Curceanu)

10:30 – 11:00 Jack Tuszynski (online) - Recent experimental tests of the quantum foundations of the Penrose-Hameroff theory

*11:00 – 11:30 Coffee Break*

11:30 – 12:00 Maurizio Benfatto - Biophotons: general aspects and new experimental data

12:00 – 12:30 Michael Drewsen - CSL-tests with sympathetic ground-state-cooled larger molecular ions

12:30 – 13:00 Charlie Beil - Spacetime geometry of spin, polarization, and wavefunction collapse

*13:00 – 14:30 Lunch*

*Chair: Fabrizio Piacentini*

14:30 – 15:00 Simone Manti - Cascade model for calculating the yields of atomic transitions in kaonic atoms

15:00 – 15:30 Stefano Forstner (online) - Nanomechanical test of quantum linearity

15:30 – 16:00 Tamás Geszti (online) - Non-signaling Schrödinger nonlinearity

*16:00 – 16:30 Coffee Break*

16:30 – 17:00 Travis Craddock (online) – Optical properties of microtubules

17:00 – 17:30 Chris Rourk (online) - Quantum collapse associated with electron tunneling in substantia nigra pars compacta tissue

17:30 – 18:00 Alessio Porcelli - High sensitivity analysis on Pauli's Exclusion Principle violation with VIP-2

**1<sup>st</sup> November 2022** – SPECIAL EVENT – Round Table: at Comune di Frascati – only in presence –  
more infos will be provided to the speakers Monday 31<sup>st</sup> October

Quantum discussions: from the theory to the experiment and back!

10:00 – 13:00 with a Coffee break

If useful continues till 16:00

From 16:00 citizens from Frascati will come and meet the scientists and ask questions)

**2<sup>nd</sup> November 2022**

*Chair: Fabrizio Napolitano*

9:30 – 10:00 Kyrlo Simonov - Observability of spontaneous collapse in flavor oscillations and its relation to the CP and CPT symmetries

10:00 – 10:30 Paweł Moskal - First in-vivo imaging of the positronium wave function collapse in the human brain

10:30 – 11:00 Ewa Stepień - Novel biomarkers and drug delivery systems for theranostics – extracellular vesicles

*11:00 – 11:30 Coffee Break*

11:30 – 12:00 Gabriel Moskal - 3D printed lightweight and modular lithium-ion Uninterruptible Power Booster for research and medical devices

12:00 – 12:30 Kamil Dulski - The decay rate of o-Ps with the J-PET detector (title tbc)

12:30 – 13:00 Damir Bosnar - Preparation of tests of CP invariance in lepton sector using ortho-positronium annihilation

13:00 – 13:30 Fabrizio Piacentini - Estimating anomalous weak values via a single photon detection

*13:30 – 15:00 Lunch*

*Chair: Diana Sirghi*

15:00 – 15:30 Antonio Di Domenico - Testing time paradoxes, discrete symmetries and all that in entangled neutral K-mesons

15:30 – 16:00 Peter Morgan (online) – The collapse of a quantum state as a joint probability construction

*16:00 – 16:30 Coffee Break*

16:30 – 17:00 Maaneli Derakhshani (online): A Question for Penrose's OR and Orch-OR

17:00 – 17:30 Sandro Donadi: Collapse dynamics are diffusive?

17:30 – 18:00 Stuart Hameroff: A tale of two gravity-related collapse models

20:00 Conference Dinner (Hostaria Santa Maria)

## **3<sup>rd</sup> November 2022**

*Chair: Kristian Piscicchia*

9:30 – 10:00 Anirudh Gundhi - Impact of dynamical collapse models on inflationary cosmology

10:00 – 10:30 Angelo Bassi - Collapse model make particle jiggle... and emit photons

10:30 – 11:00 Lajos Diosi - How to teach and think about spontaneous wave function collapse theories: not like before

*11:00 – 11:30 Coffee Break*

11:30 – 12:00 Ron Folman - Realization of a complete Stern-Gerlach interferometer: Towards a test of the foundations of QM as well as the interface with gravity

12:00 – 12:30 Fabrizio Napolitano - Underground tests of quantum collapse at Gran Sasso

12:30 – 13:00 Anupam Mazumdar (online) – Witnessing quantum aspects of gravity

13:00 – 13:30 Paula Reichert (online) - Bohmian Mechanics & Primitive Ontology

*13:30 – 15:00 Lunch*

*Chair: Pawel Moskal*

15:00 – 15:30 Alessandro Scordo - Recent advancements in radiation detectors for precision experiments

15:30 – 16:00 Antonino Marciano (online) - Stochastic Renormalization Group a' la Ricci and Covariant Gravitational Collapse of the Wave Function

*16:00 – 16:30 Coffee Break*

16:30 – 17:00 Inwook Kim (online) - Test of Collapse Models with the MAJORANA DEMONSTRATOR'

17:00 – 17:30 Kristian Piscicchia - High Sensitivity Tests of Quantum Gravity Induced Spin Statistics Deformation

17:30 – 18:00 Christoph Simon (online) - Could entanglement play a role in the brain?

## **4<sup>th</sup> November 2022**

*Chair: Otón Vázquez Doce*

9:30 – 10:00 Thomas Durt (online) - A realization of de Broglie's Double Solution program: how self-induced collapse allows us to solve the measurement problem

10:00 – 10:30 Hendrik Ulbricht (online) - Experimental testing wavefunction collapse with mechanical systems

10:30 – 11:00 Mihai Iliescu - Bose Einstein Condensates for Gravitational Wave Detection

*11:00 – 11:30 Coffee Break*

11:30 – 12:00 Marco Merafina - Massive candidates for DM halos: new developments

12:00 – 12:30 Luca De Paolis – The KAMEO experiment: investigating the E2 Nuclear Resonance effect in Kaonic Atoms

12:30 – 13:00 Kartik Kakade (online) - An Introduction to Trace Dynamics

13:00 – 13:30 Lukasz Kaplon - Comparative studies of commercial and synthesized plastic scintillators for medical applications

13:30 – 13:40 Conclusions and Farewell