

# One year of BiCoQ

Tommaso Tabarelli de Fatis

(Università di Milano Bicocca and INFN Sezione di Milano Bicocca)

## Outline

- Goals
- Research
- Recruitments
- Infrastructures
- Higher education

### Centro Bicocca di Cosmologia Quantitativa

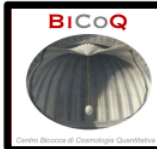
The Bicocca Centre for Quantitative Cosmology (BiCoQ) is a new research centre within the Department of Physics "G. Occhialini" of the University of Milano-Bicocca, which is devoted to the study of the nature of matter, gravity, and energy in our Cosmos.

**BiCoQ**



Centro Bicocca di Cosmologia Quantitativa

<https://bicoq.fisica.unimib.it/>



## Centro Bicocca di Cosmologia Quantitativa (BiCoQ)

### Objectives:

- ▶ **Research:** Consolidate, integrate and expand scientific research and technological innovation in astrophysics, experimental physics and theoretical physics of fundamental interactions
  - ▶ **Focus: gravitation, dark energy and dark matter**
- ▶ **Infrastructures:** Integrate with existing efforts to share and expand infrastructures:
  - ▶ Laboratorio BiCoQ (merging efforts with BiCuTe and microwave laboratory)
  - ▶ Computing infrastructure (HPC)
- ▶ **Higher education:** Spur and fertilize higher education with training programs, seminars, etc. and impact on the attractiveness
- ▶ **Recruitments:** Strong plan of (additional) recruitments in support of the activities

### Funds awarded by MUR (2023-2027):

**7.782.325,00 Euro**

- |                                        |                   |
|----------------------------------------|-------------------|
| ▶ Recruitments:                        | 4.392.258,00 Euro |
| ▶ Instrumentation and infrastructures  | 1.771.000,00 Euro |
| ▶ Higher education                     | 870,000,00 Euro   |
| ▶ Others (“premieria” and contingency) | 141,000,00 Euro   |

### DFO governing board

- ▶ M. Colpi, M. Carpinelli, L. D’Alfonso, M. Fumagalli (deputy-PI), G. Gorini, TTdF (PI), F. Terranova
- ▶ G. Albani, R. Cattaneo, *G. Liguori*

10:00 → 11:20

## BiCoQ research lines

Convener: Michele Fumagalli (UniMiB)

10:00

### ARMONIA: Dark Matter and Dark Energy from astrophysical observations

Speaker: Alejandro Benitez Llambay (UniMiB)

10:20

### CADMO: Dark Matter search with particle beams

Speaker: Francesco Terranova (Universita & INFN, Milano-Bicocca (IT))

10:40

### GRAF: Gravitational waves data and global fit ¶

Speaker: Riccardo Busicchio (UniMiB)

11:00

### BAUSCIA: An antenna for high frequency gravitational waves

Speakers: Matteo Borghesi, Matteo Borghesi

11:40 → 12:40

## BiCoQ Seminar

Convener: Tommaso Tabarelli de Fatis (Universita & INFN, Milano-Bicocca (IT))

11:40

### PTOLEMY: unraveling the cosmology of relic neutrinos

Speaker: Chris Tully (Princeton University (US))

## ▶ MUR funds

- ▶ RTD-B FIS/04 (“CADMO”) - **Antonio Branca** start date: **01/12/2023**
- ▶ RTD-B FIS/04 (“BAUSCOA”) - **Lucia Canonica** start date: **16/12/2023**
- ▶ RTD-B FIS/05 (“ARMONIA”) - Selection process underway
- ▶ TECNICO Laureato (“Lab. BiCoQ”) - Selection process underway
- ▶ PA FIS/05 (“GRAF”) - Call postponed to 2024 (following a call for Eol)
- ▶ All recruitments shall be completed by the end of 2024

## ▶ DFO funds (“cofin”)

- ▶ PO FIS/05 – “Chiamata diretta” - **Piero Madau**
- ▶ Tecnologo TD (BiCoQ program manager) - **Roberta Cattaneo**
- ▶ Two post-doc positions (2 years) - Selection in progress
- ▶ Two additional post-doc positions in 2025

# Infrastructures

- ▶ **Total funding:** **~1.77 MEuro**
  - ▶ Cost items listed in the proposal and refined in April 2023 to match the awarded budget
  - ▶ Expenditures are progressing with some administrative delays for the large-cost items, but the spending profile is well understood, monitored, and under control
  
- ▶ **Spent or committed in 2023:** **~1.19 MEuro (~67% of the total)**
  - ▶ **120 kEuro** Laboratory instrumentations and sensors (ARMONIA / BAUSCIA)
  - ▶ **170 kEuro** Upgrade the microwave instrumentation (ARMONIA)
  - ▶ **700 kEuro** Dilution refrigerator for the BiCoQ Laboratory (BAUSCIA)
    - ▶ Tender documentation ready on our side (thank to A. Nucciotti)
    - ▶ Tender publication by the Procurement Office (\*) expected in early Q1 2024
  - ▶ **200 kEuro** Contribution to the HPC machine (ARMONIA / GRAF)
  
- ▶ **BiCoQ Lab (with BiQuTe)**
  - ▶ Area identified (Zona Aule U2-08a/b) and service needs fully specified (thanks to A. Nucciotti)
  - ▶ Executive project under definition (\*)
  - ▶ BiCoQ contribution to construction work: **200 kEuro**
    - ▶ The instrumentation that is being procured shall be temporarily installed and operated with some (in)efficiency in corners of existing labs (already verified by the office)

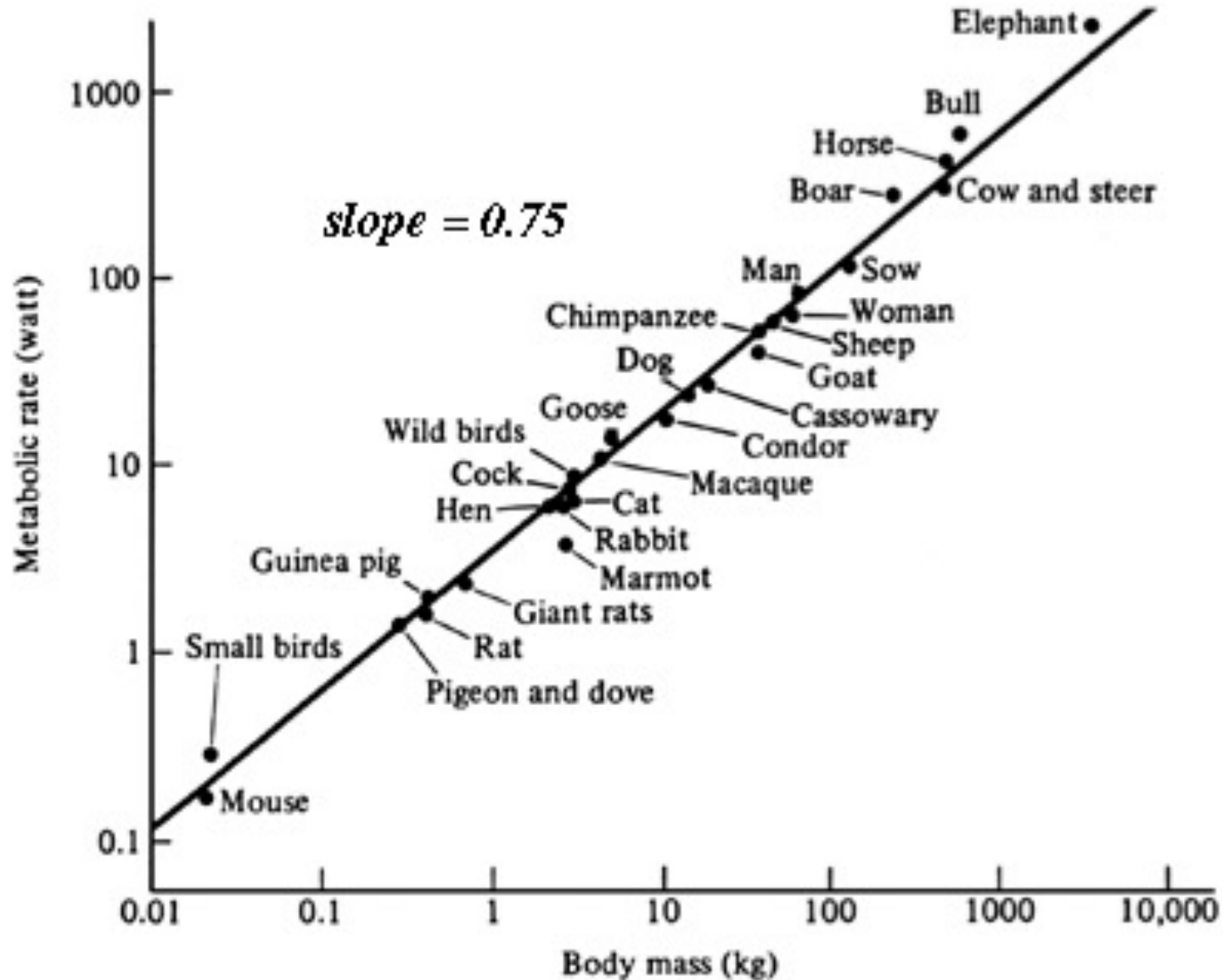
- ▶ **Total amount of allotted funds: 870 kChF**
  - ▶ Actions outlined in the proposal targeting the definition of the executive plan by now:
    - ▶ Ph.D in physics, visiting program, workshops
  
- ▶ **BiCoQ Workshops: 2025 and 2027**
  - ▶ Allotted funds: **100k**
  - ▶ Definition of the plan in due time (M. Fumagalli)
    - ▶ Awards being considered to boost attractiveness and let us know about best profiles
  
- ▶ **Visiting program:**
  - ▶ Allotted funds: **100k**
  - ▶ Short (week) and medium-term visiting for research work or teaching at DFO
    - ▶ Eligible expenses: travel, lodging and meals (and seminar/lectures, if applicable)
    - ▶ Proposals to be submitted by a DFO member to the governing board shall contain the motivations and description of the activity
    - ▶ Detailed information will be published on the BiCoQ website

Continues on the next page

# Higher education (“Alta qualificazione”)

- ▶ **Total amount of allotted funds: 870 kChF**
  - ▶ Actions outlined in the proposal targeting the definition of the executive plan by now:
    - ▶ Ph.D in physics, visiting program, workshops
  
- ▶ **Contributions to the PhD School in Physics**
  - ▶ Allotted funds: **~600 kEuro**
  
- 1. Six doctoral fellowships (“borse di dottorato”)**
  - ▶ 2 fellowships on BiCoQ research lines + 1 fellowship on fundamental research 2024-26
  - ▶ 2 fellowships on BiCoQ research lines + 1 fellowship on fundamental research 2025-27
  
- 2. One time contribution of 100 kEuro to increase the research fund for PhD students**
  - ▶ Corresponding to about 1500 Euro/student over three years (average)
  - ▶ The Director of the Ph.D. in physics will decide on the use for workshops, schools, etc.
  
- 3. Institution of a “BiCoQ doctoral school” on a biennial basis**
  - ▶ Topical school of one week on a subject of broad interest
  - ▶ Free for our Ph D students open with fee to everyone
    - Allotted funds for 2 editions: 2024 and 2026
    - Continuity beyond 2026 with fees and sponsors (if we make it a success)
  - ▶ 1st Edition: Machine learning and AI in fundamental research and elsewhere
    - Organizing committee being formed

# Off-topic?





- ▶ **BiCoQ is shaped and starts moving**
- ▶ **Enjo the Xmas party**
- ▶ **Happy 2024**





**A Christmas party**  
**“4+1 questions and a toast”**  
 Dipartimento di Fisica “G. Occhialini”  
 Sezione INFN di Milano – Bicocca

**Thursday, 2023, Dec 14th**  
**Aula Sironi, U4-08**

---

**9:30 Introduction** *chair: Laura D’Alfonso*

9.30 – Welcome Giuseppe Gorini  
 9.45 – One year of BiCoQ Tommaso Tabarelli

---

**10:00 BiCoQ research lines** *chair: Michele Fumagalli*

10:00 – *ARMONIA: Dark matter and energy from astrophysics* Alejandro Benitez Llambay  
 10:20 – *CADMO: Dark matter search with particle beams* Francesco Terranova  
 10:40 – *GRAF: Gravitational waves data and global fit* Riccardo Busicchio  
 11:00 – *BAUSCIA: A high-frequency GW antenna* Matteo Borghesi

Ore 11:20 **Break**

---

**11:40 BiCoQ seminar (streaming)** *chair: Tommaso Tabarelli*

**11:40 – PTOLEMY: unraveling the cosmology of relic neutrinos** Chris Tully (Princeton)

Ore 12:30 **Toast and party**

---

**14:30 Consiglio di Dipartimento** *chair: Giuseppe Gorini*

Event URL: <https://indico.cern.ch/event/1351579/>  
 Zoom URL: <https://cern.zoom.us/j/67737042190?pwd=QlJkOHgrWS8vODFYSFc2STd0S1lzZz09>