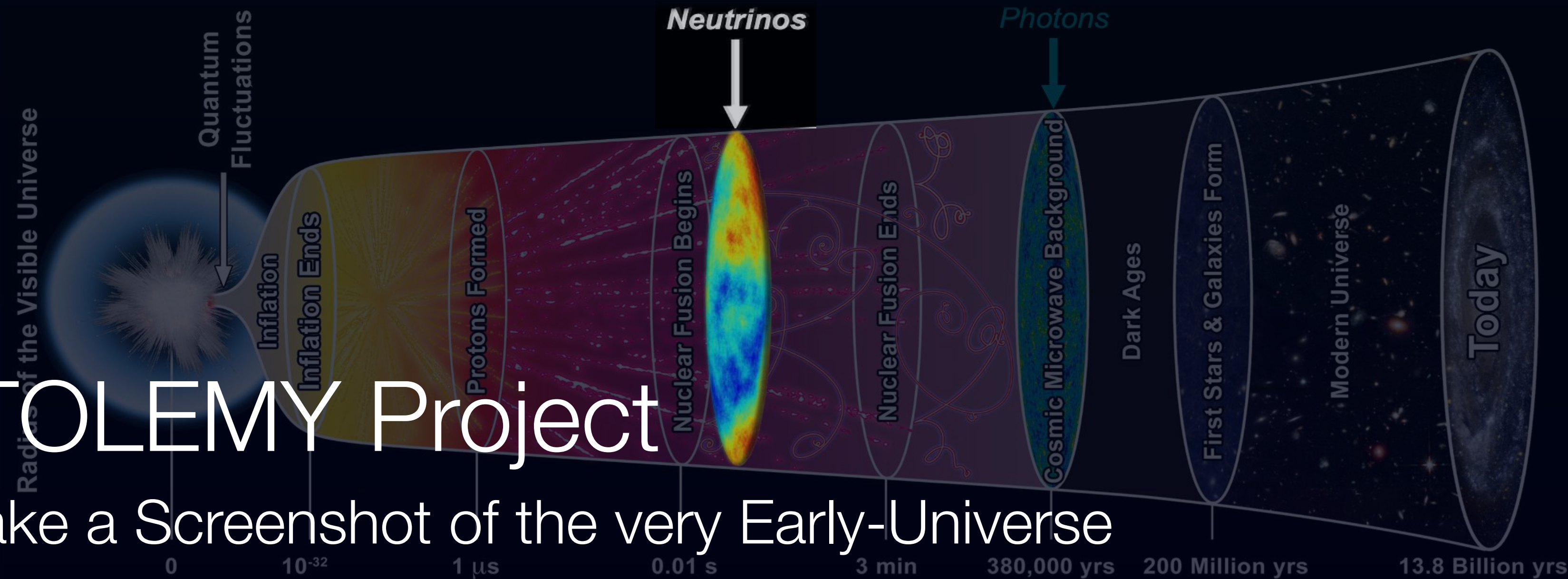


The PTOLEMY Project

How to Make a Screenshot of the very Early-Universe

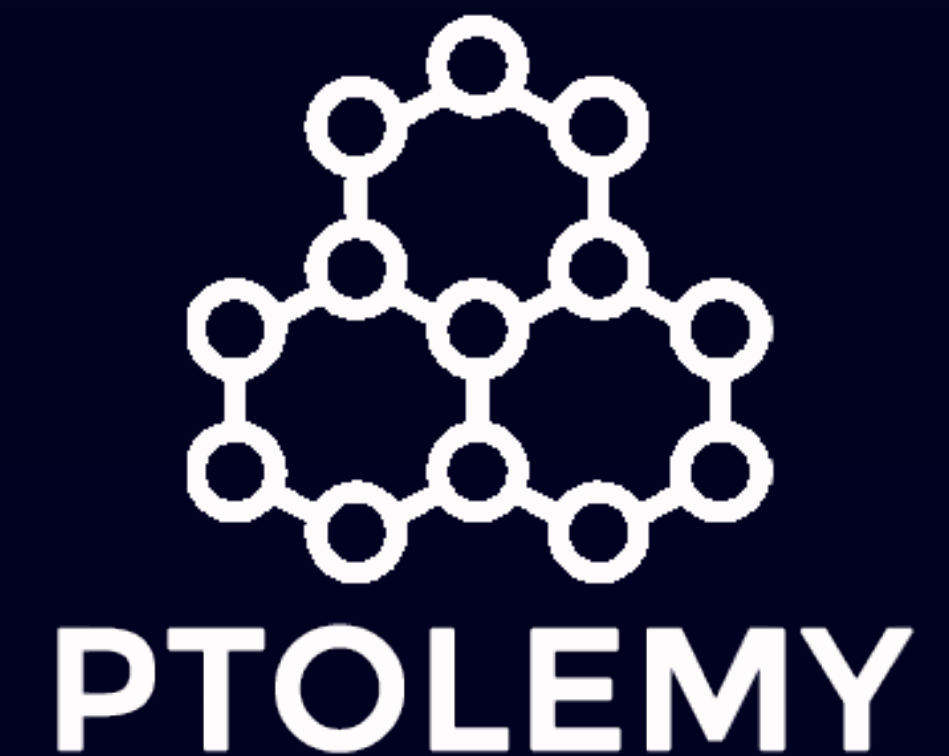


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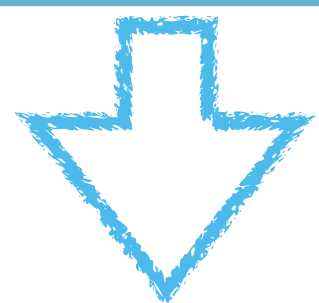
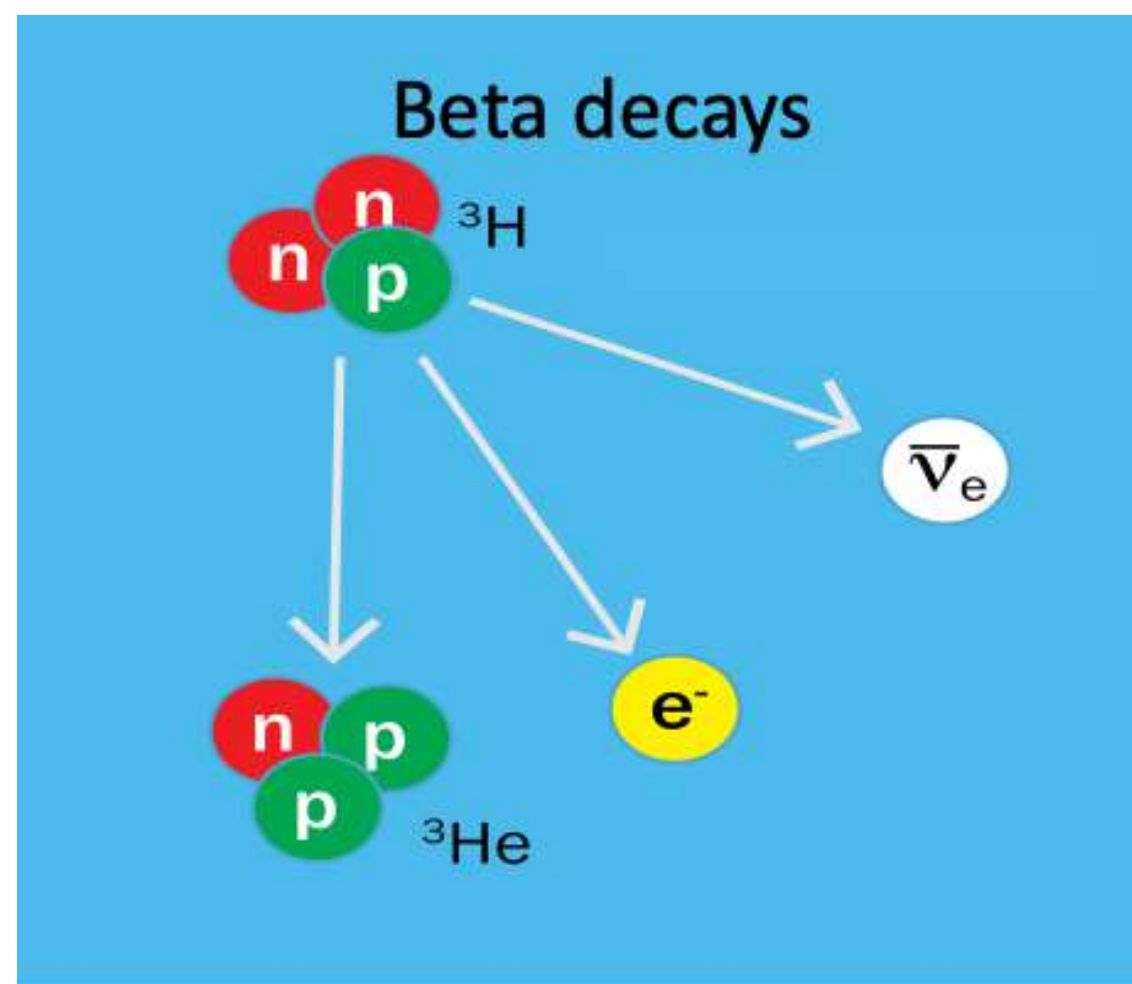
Presentation for GSSI Astroparticle Science Fair, 24 February 2025

Francesca Maria Pofi on behalf of the PTOLEMY Collaboration



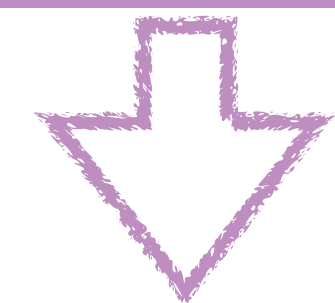
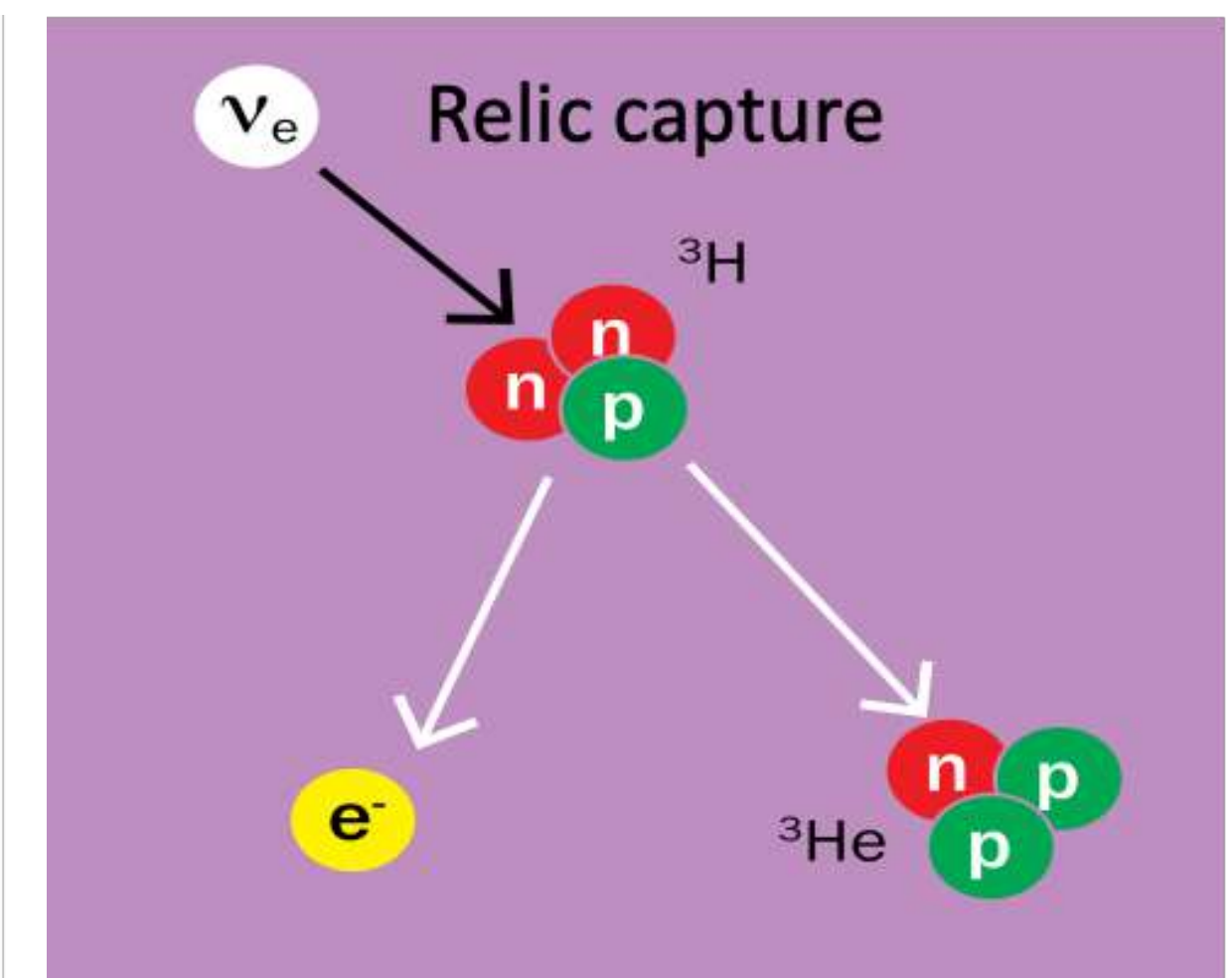
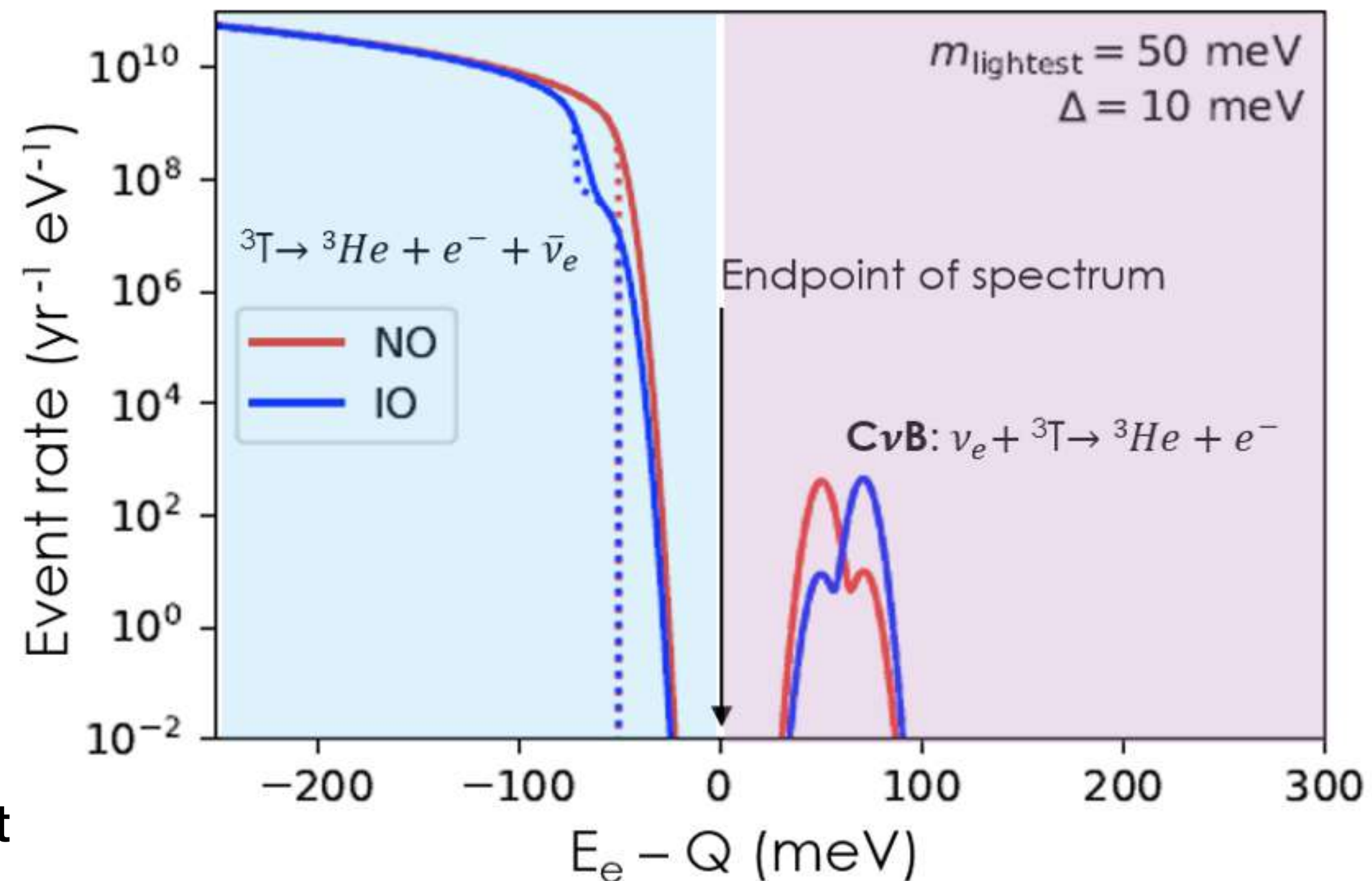
Detection concept: Neutrino Capture

☑ Let's take a β -unstable nucleus eg Tritium (${}^3\text{H}$) \longrightarrow What we can get?



Neutrino mass measurement
from endpoint distortion

(1st goal)

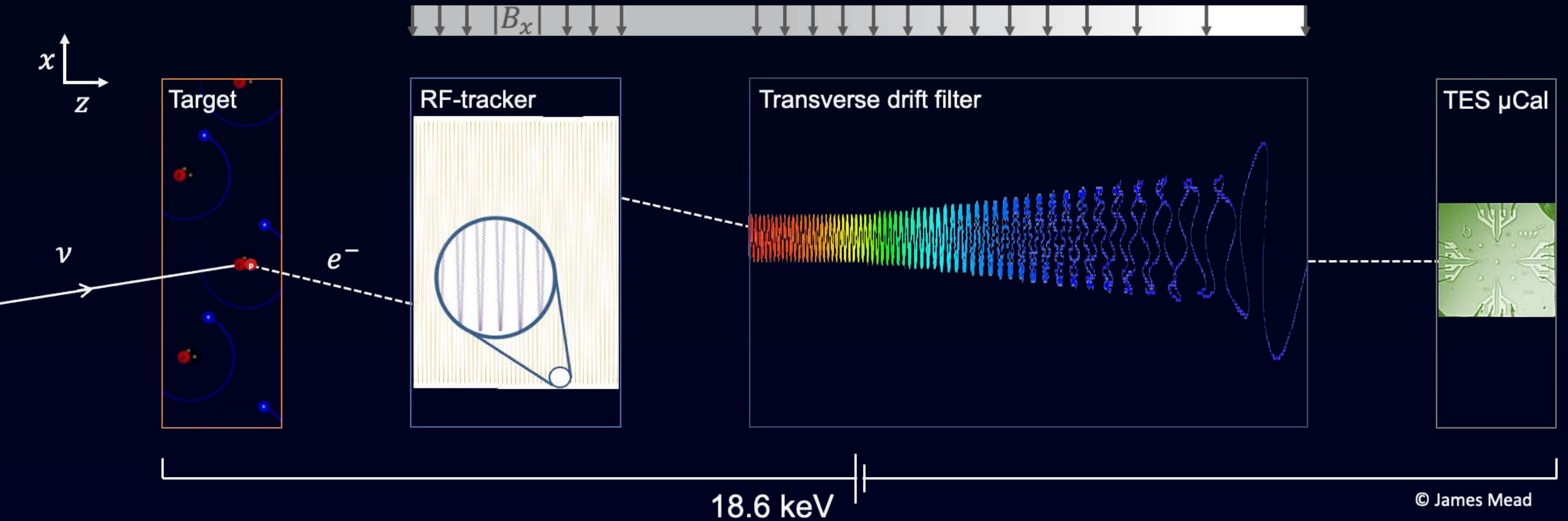


First detection of
Cosmic Neutrino Background

(Final goal)

A Cross-Disciplinary Detector

PonTecorvo / PrinceTon Observatory for Light Early-universe Massive-neutrino Yield

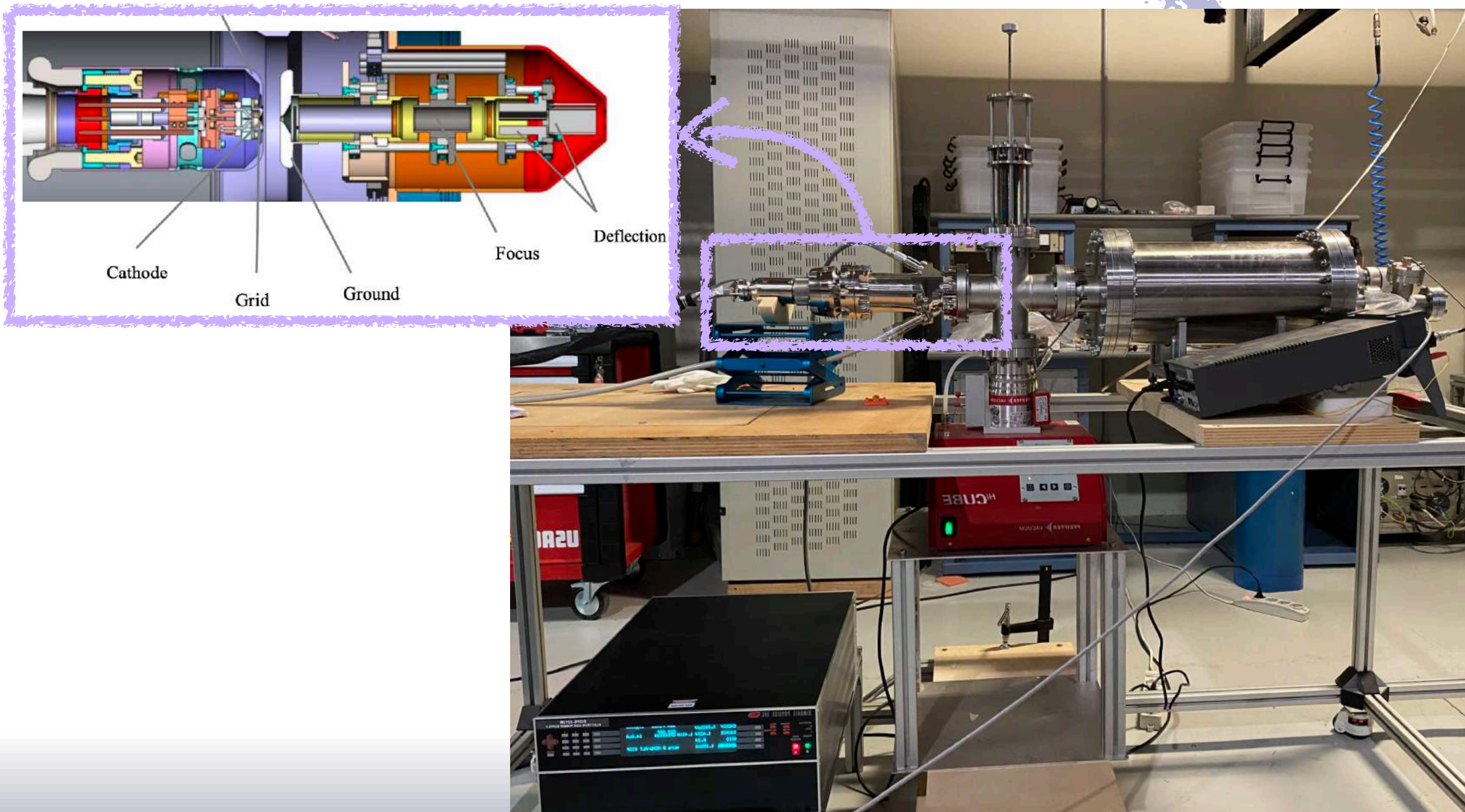
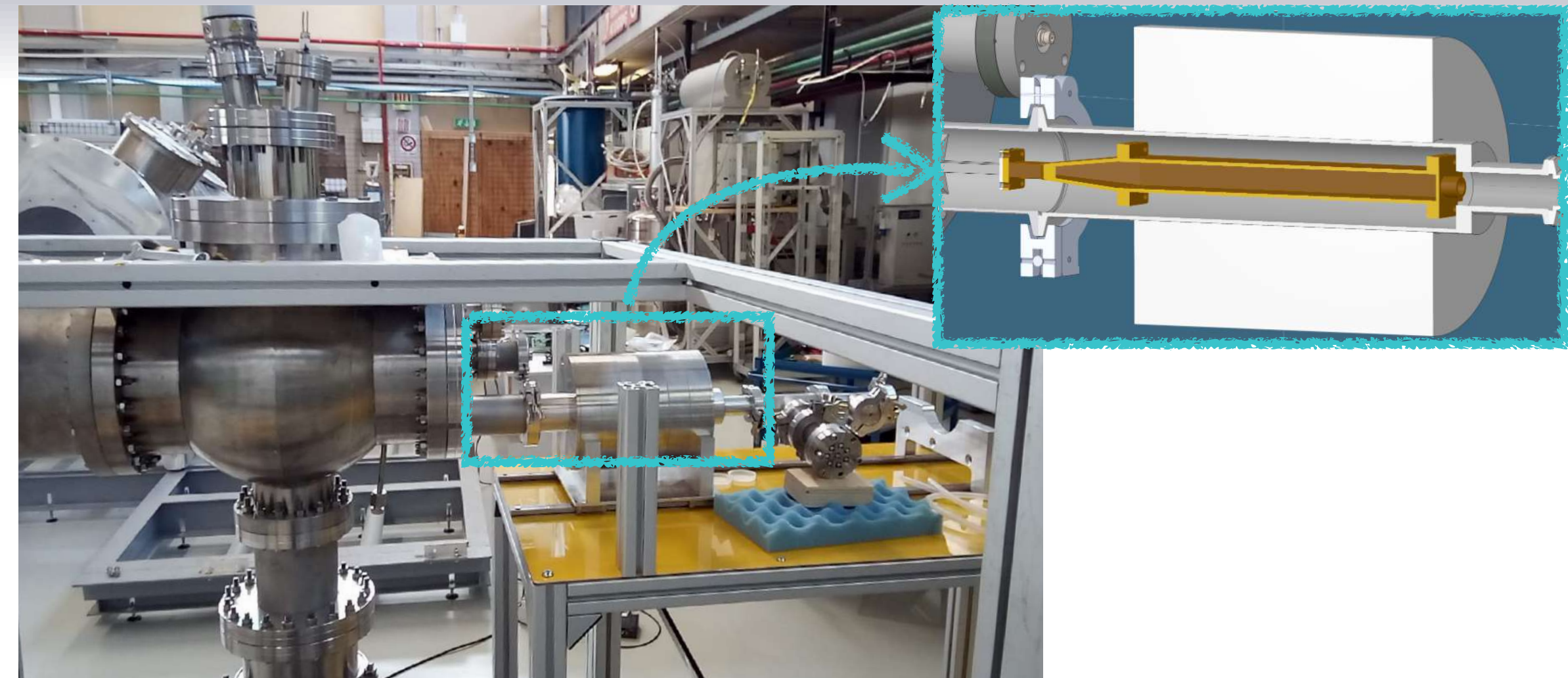


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$$E_{total} = q(V_{TES} - V_{target}) + E_{RF} + E_{cal}$$

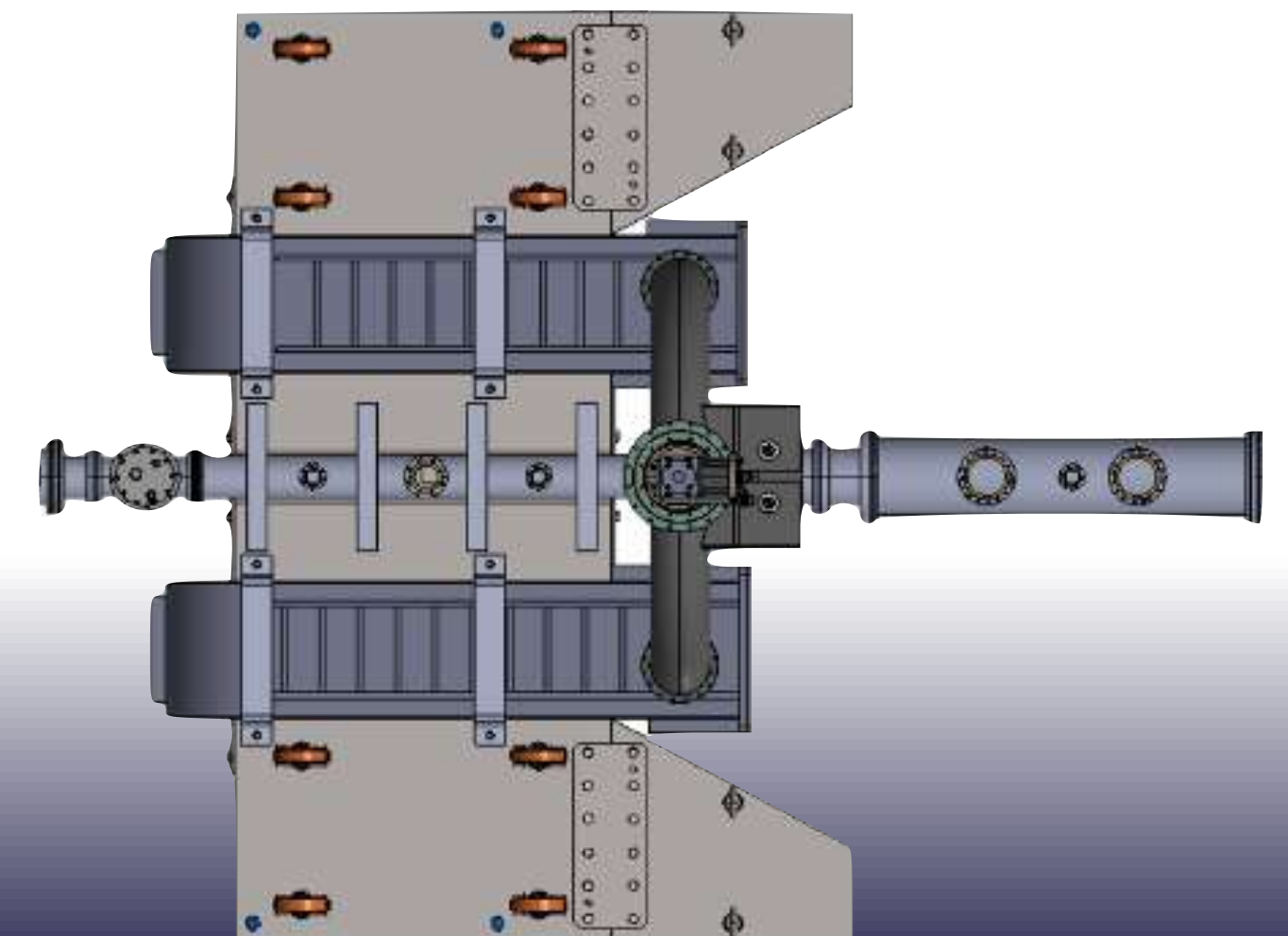
Demonstrator @ LNGS

RF detection setup with ^{83m}Kr injection

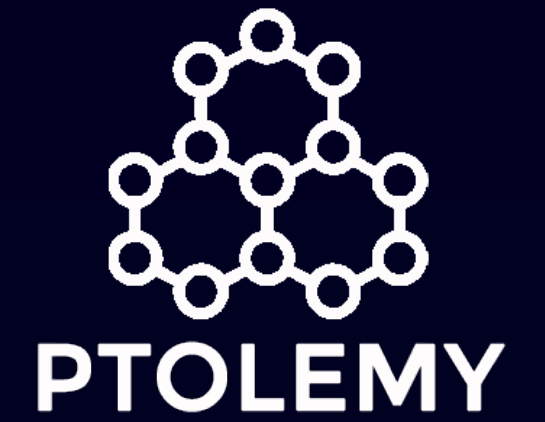


Electron gun setup for calibration

Magnet for transverse drift filter
arriving in Sep 2025!



To Recap



▶ RF radiation detection, filter calibration setup & neutrino mass sensitivity studies ongoing @ LNGS

▶ **Demonstrator** under construction *from this year @ LNGS*

▶ First Goal: **Neutrino Mass Measurement**
Final Goal: **CvB Detection**

▶ The PTOLEMY LNGS group:

- > Riccardo Biondi (GSSI)
- > Alfredo Cocco
- > Nicola D'Ambrosio
- > Alfredo Ferella
- > Matthias Lubenstein
- > Marcello Messina
- > Francesca Maria Pofi (GSSI)
- > Andrei Puiu
- > Nicola Rossi
- > Federico Virzi

▶ To know more come to **visit us @ our poster!**

The poster titled "The PTOLEMY Project: How to Make a Screenshot of the very Early-Universe" by Francesca Maria Pofi on behalf of the PTOLEMY Collaboration at Gran Sasso Science Institute & INFN LNGS. It details the experimental setup for measuring the relic neutrino background (CvB) from matter 1 second after the Big Bang. The poster is divided into several sections: Introduction, Ingredients, Demonstrator @ LNGS, and How it Looks. The Ingredients section lists: Tritium Target, Preslector, Dynamic Filter, and Electron Detector. The Demonstrator @ LNGS section describes the current status of the experiment, including the arrival of the detector components and the ongoing calibration and optimization work. The How it Looks section provides a 3D visualization of the detector components and their arrangement within the experimental cavern.