Liquid scintillator detector (Borexino-2)

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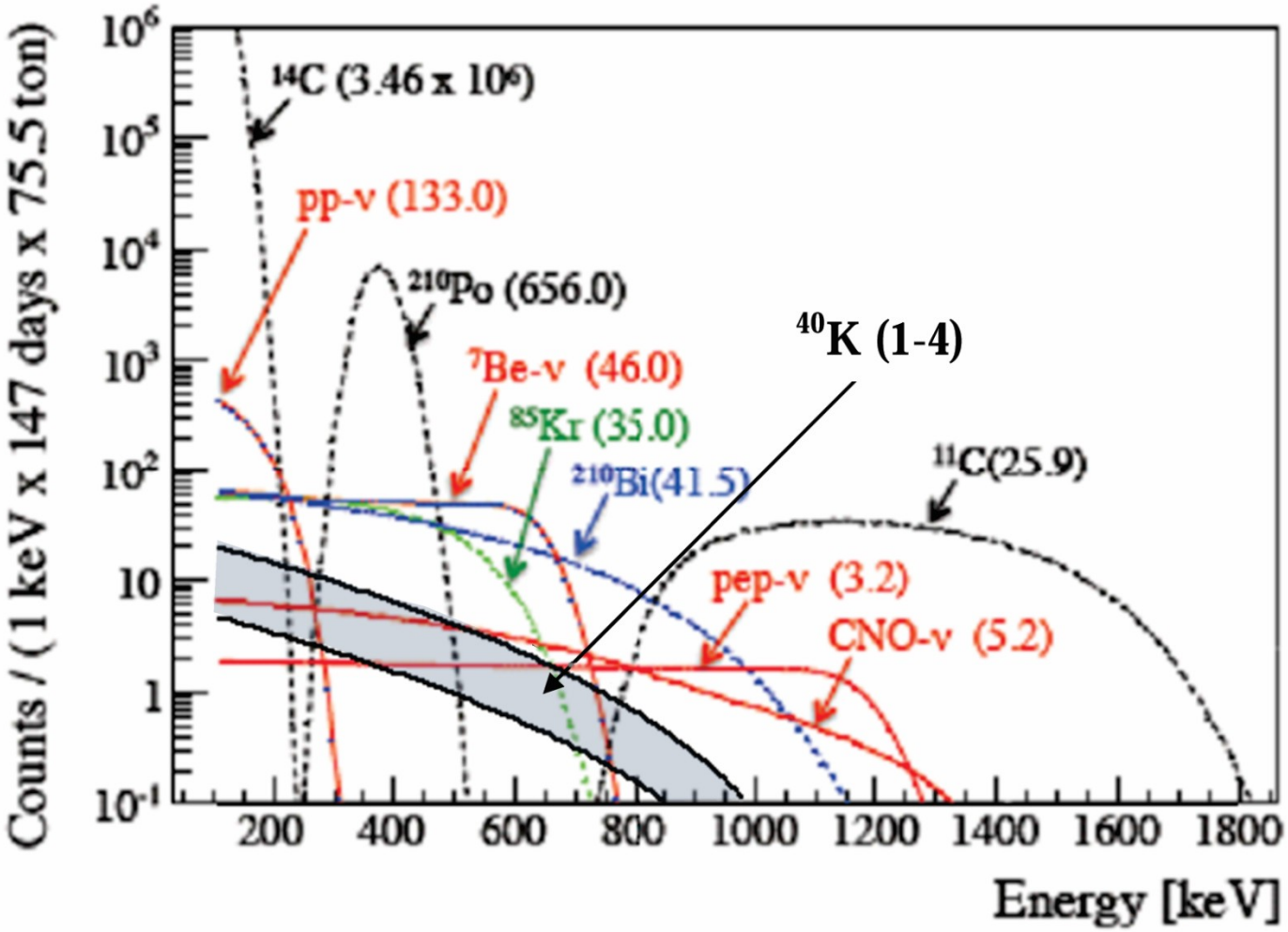
Introduction

- There is a new challenge for particle physics.
- Looking for ^{40}K antineutrino flux from Earth inside.
- It is important for some reasons for all mankind.
- Climate change, mean temperature growing up on the surface.
- It looks like Earth thermal flux is much larger than 47 TW.

The idea was proposed some time ago to Borexino collaboration to measure ^{40}K antineutrinos



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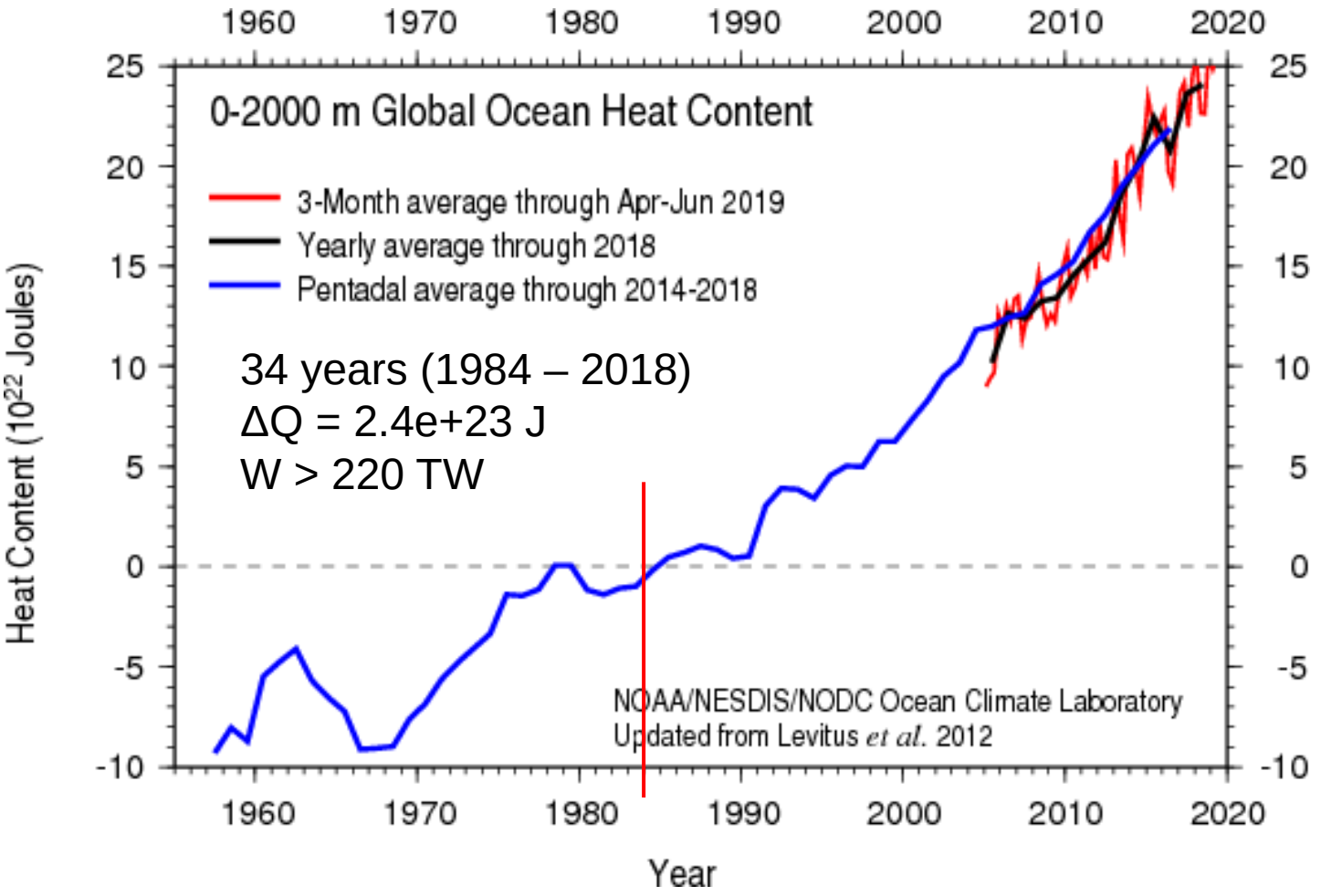
Large volume homogeneous detectors

- Borexino 300 t (100 t) Italy, Gran Sasso
- KamLAND 1000 t (600 t), Japan, Kamioka
- SNO+ 1000 t (?), Canada, Sudbery
- JUNO 20 kt (10-15 kt?), China
- JinPing 4 kt (?), China
- Baksan 10 kt (?), Russia, BNO
-

What could be done at Baksan?

Do we need to copy Jinping? or other detector (Borexino, KamLAND)?
What are the goals for the detector?
If we think on geoneutrinos we must add in research the looking for ^{40}K antineutrinos from the Earth. It is the only explanation of much larger (200-300 TW) Earth thermal flux than it was accounted before (47 TW).

World ocean heating



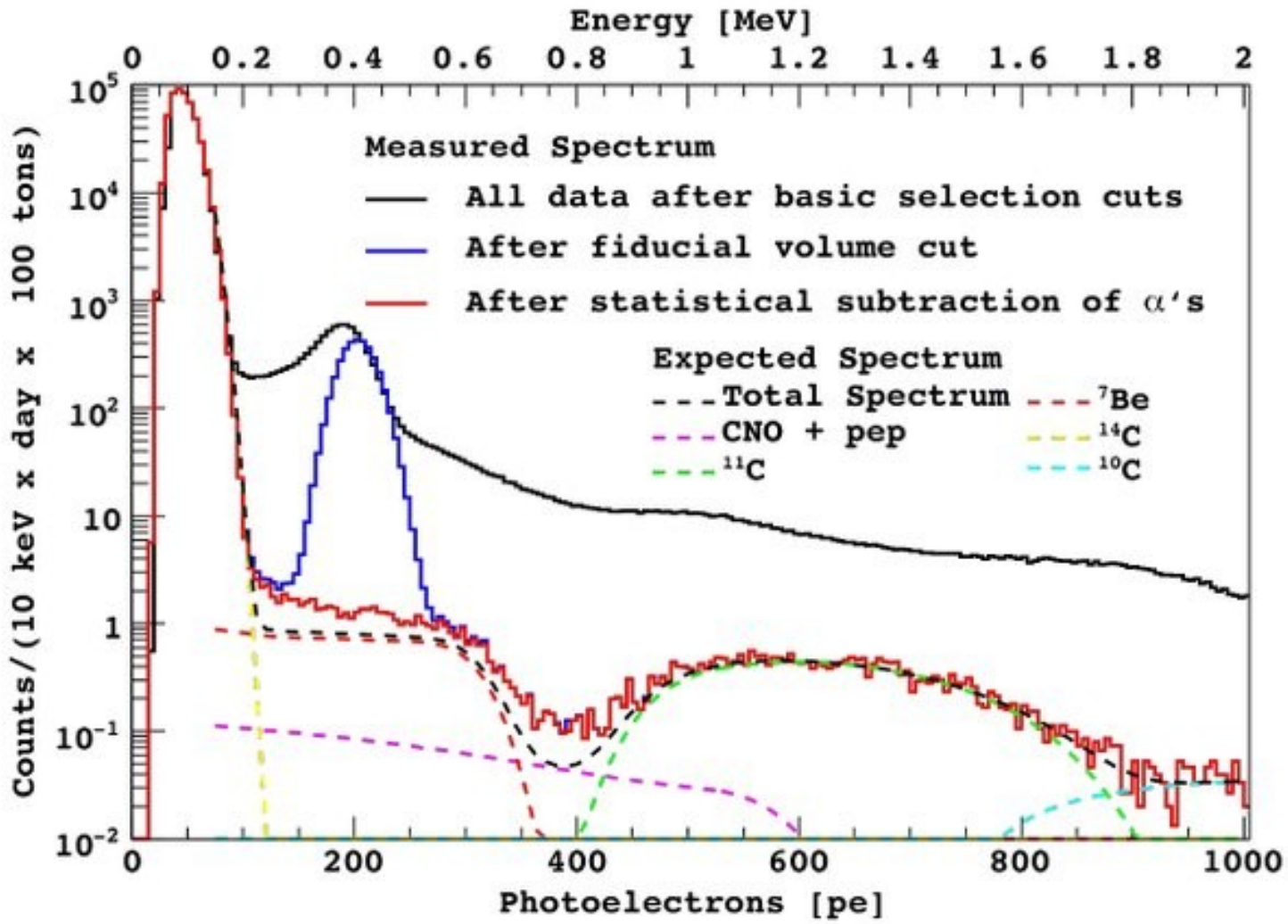
Borexino-2

On base of Borexino experience we would like to propose the modernization of Borexino detector and installation it in some suitable place other then Gran Sasso (BNO?)

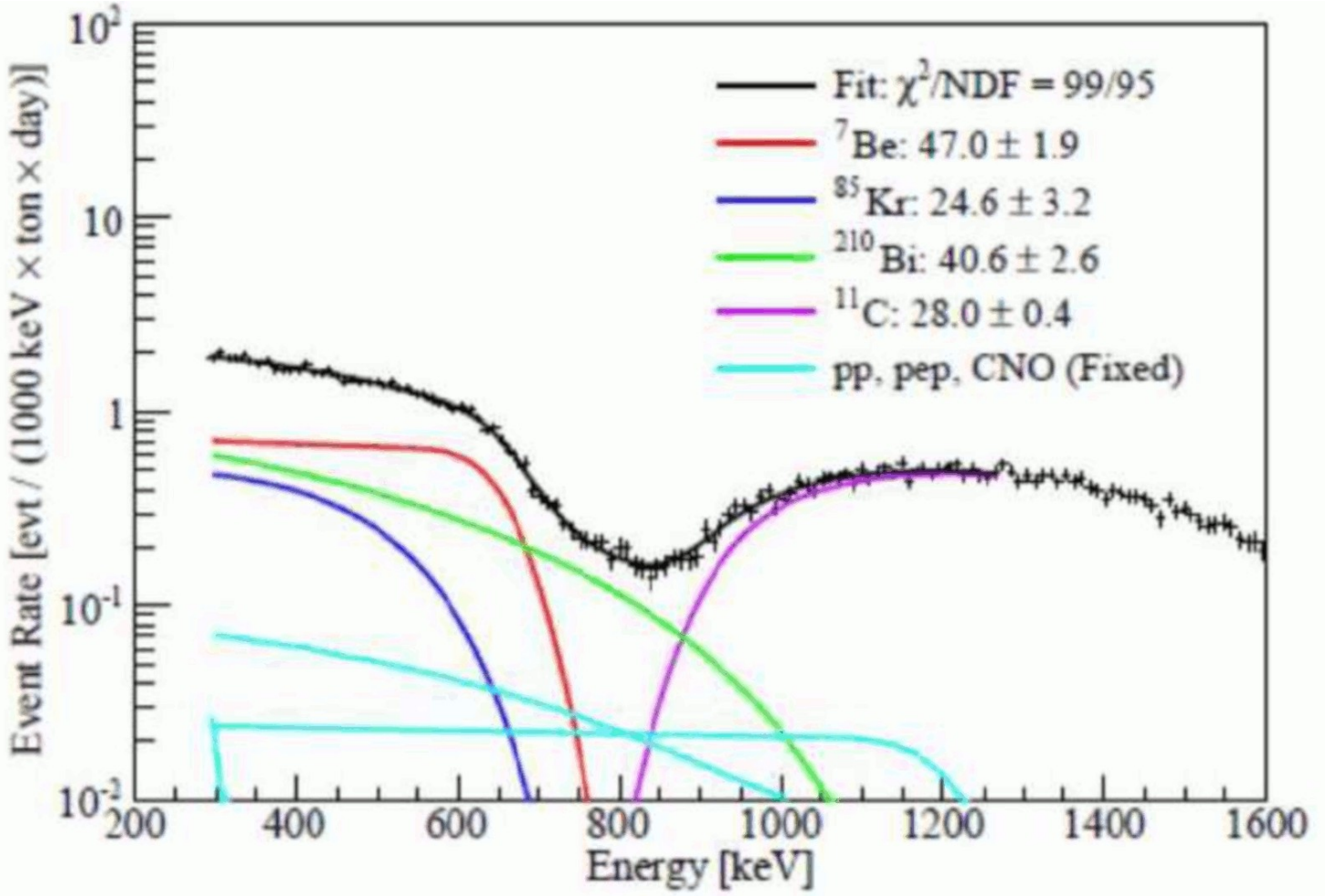
The proposal includes:

- Preparation of the hall (increasing height, clean room),
- Creating (or using existing if it is) infrastructure: electricity, ventilation,
- Scintillation purification system with better level of purification (it is needed at least one order better on U and Th)
- Producing more clean film with the same (or slightly larger) volume
- Installation new PMTs
- etc

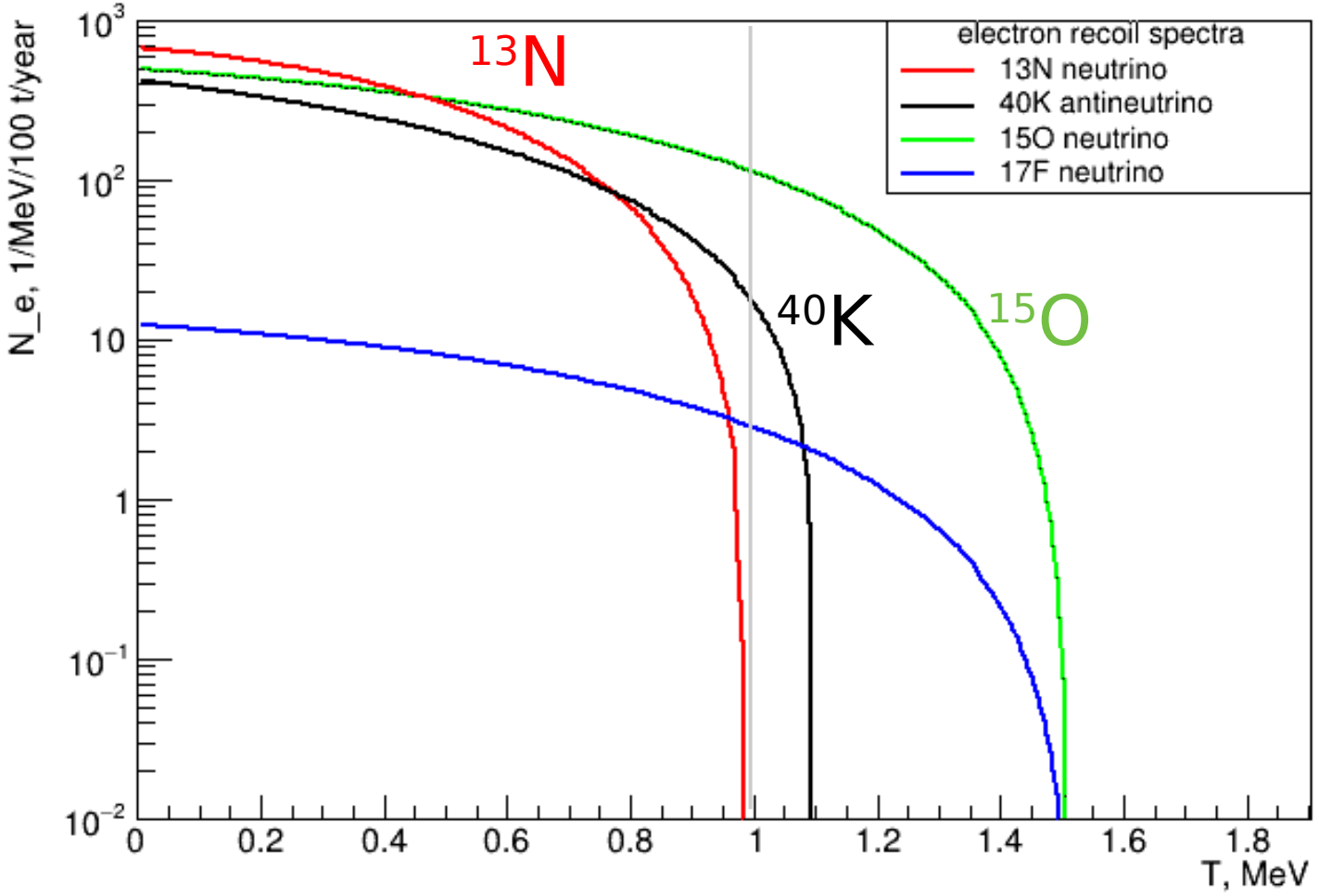
Borexino measured spectrum



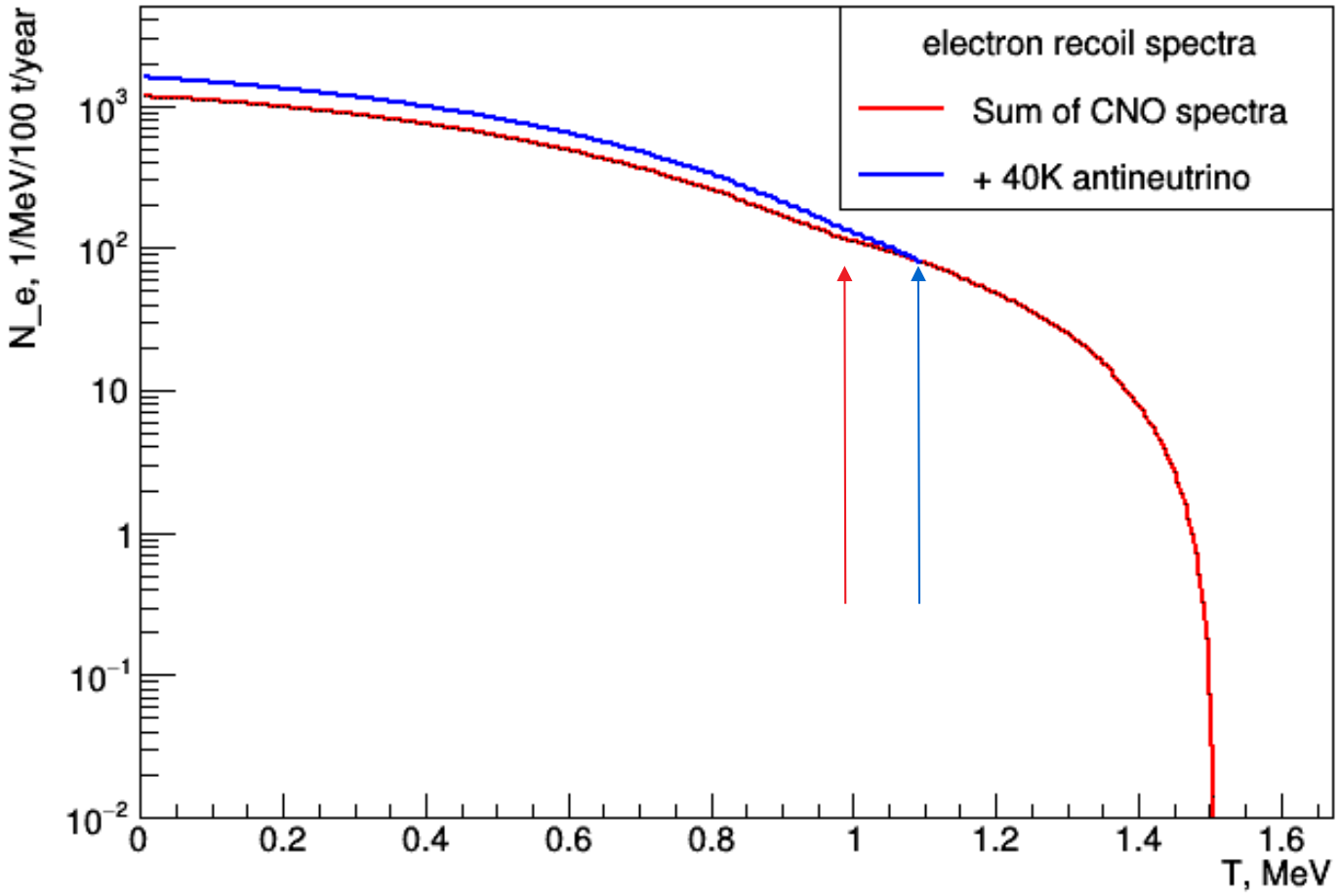
Another view of Borexino spectrum



Spectra from CNO cycle neutrinos and ^{40}K antineutrinos in a detector as recoil

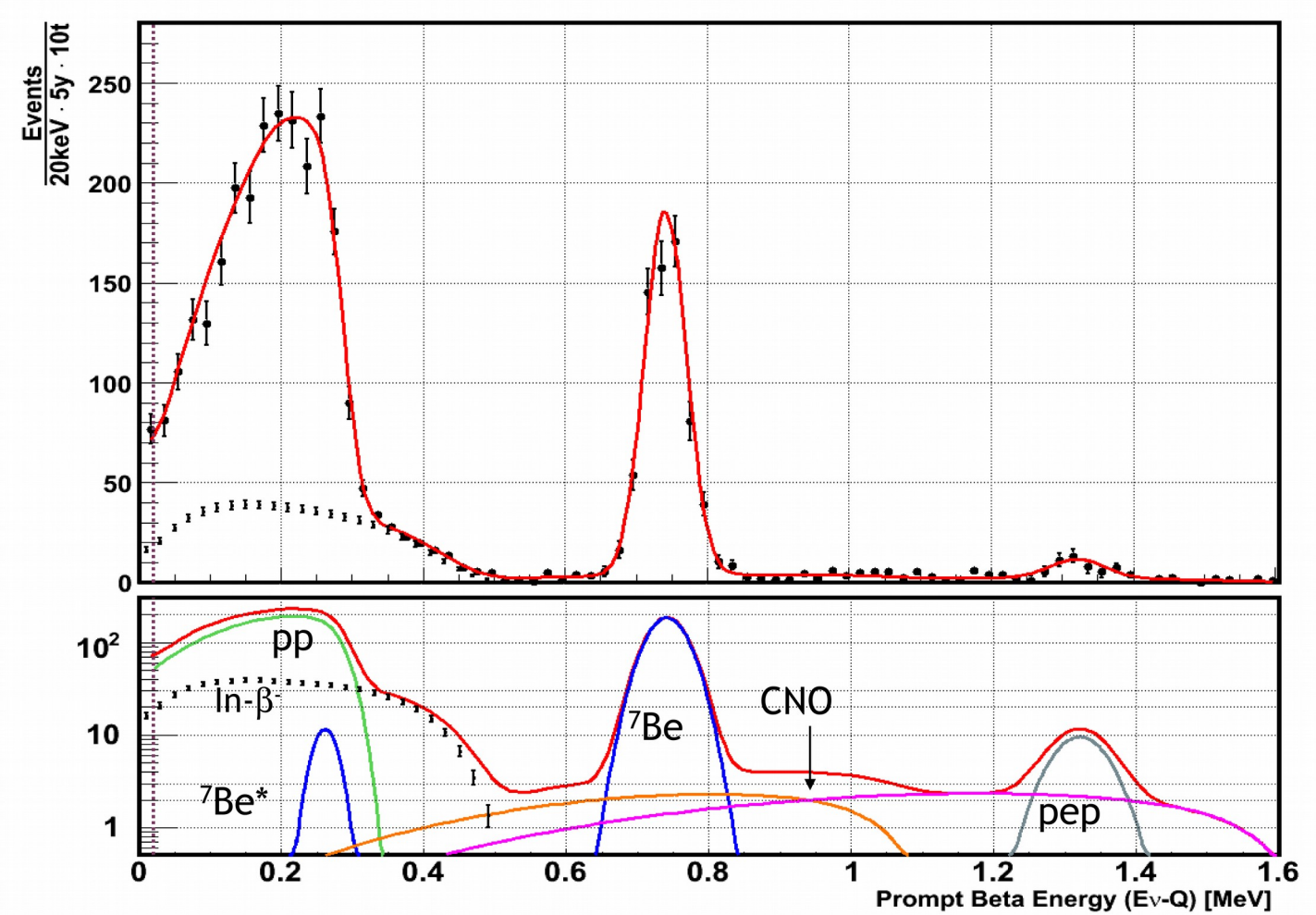


Our prediction for possible observation of CNO neutrinos Borexino detector 100 t



Independent measuring of CNO neutrinos

Spectrum that could be measured by detector with 10 t of ^{115}In in 5 y



R.S. Raghavan, Phys. Rev. Lett. 37 (1976) 259; arXive: hep-ph/0611178

Conclusion and outlook

- At Baksan we need an ambiguous goal. Looking for ^{40}K antineutrinos and CNO neutrinos looks very attractive for this.
- The realization of it demands the international collaboration.
- Collaboration demands of total Baksan infrastructure refining.
- For CNO neutrinos additionally it might be good to make another detector, say with indium target.

Thank you for the attention

The same as on page 11 in linear scale