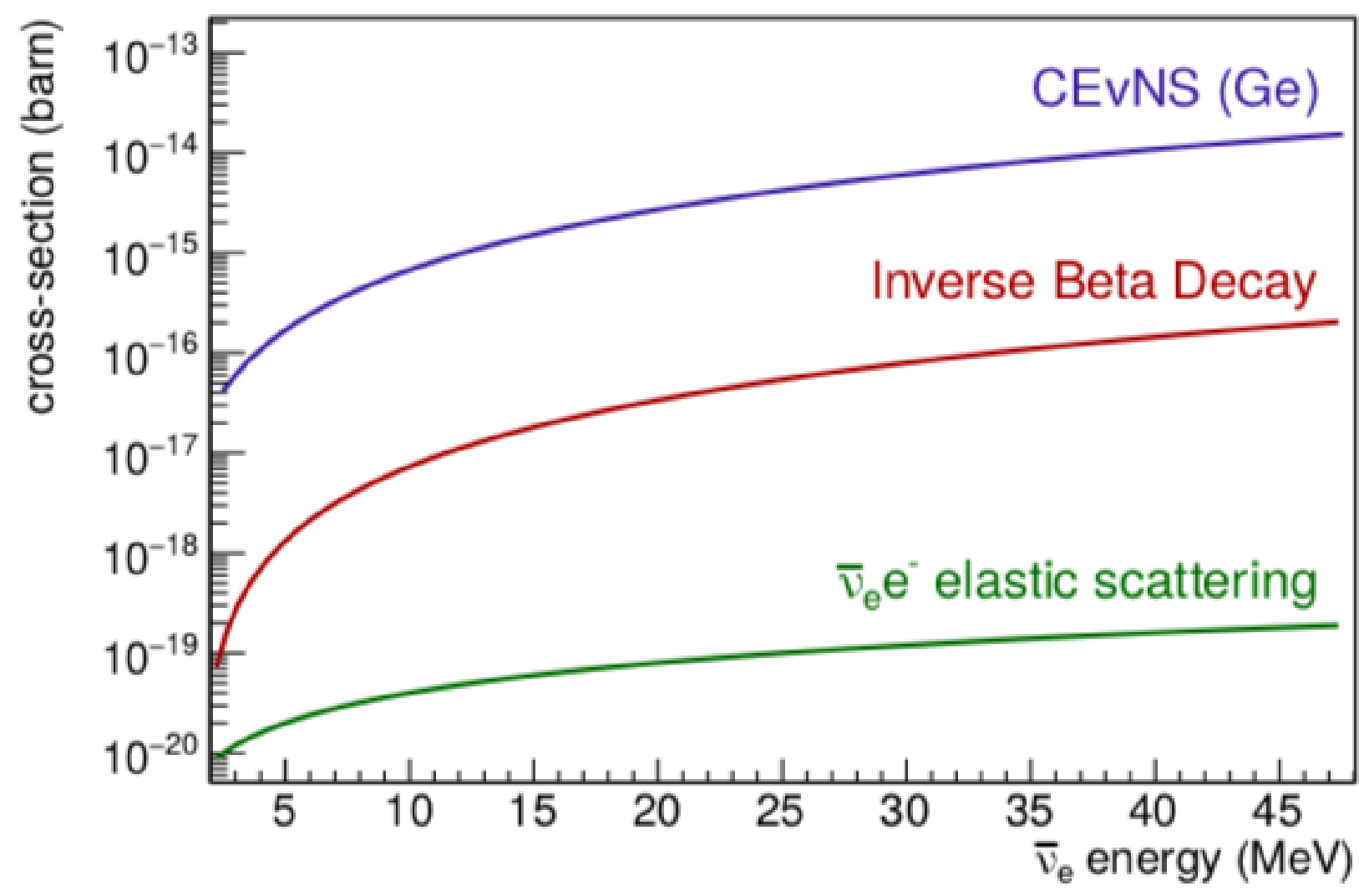
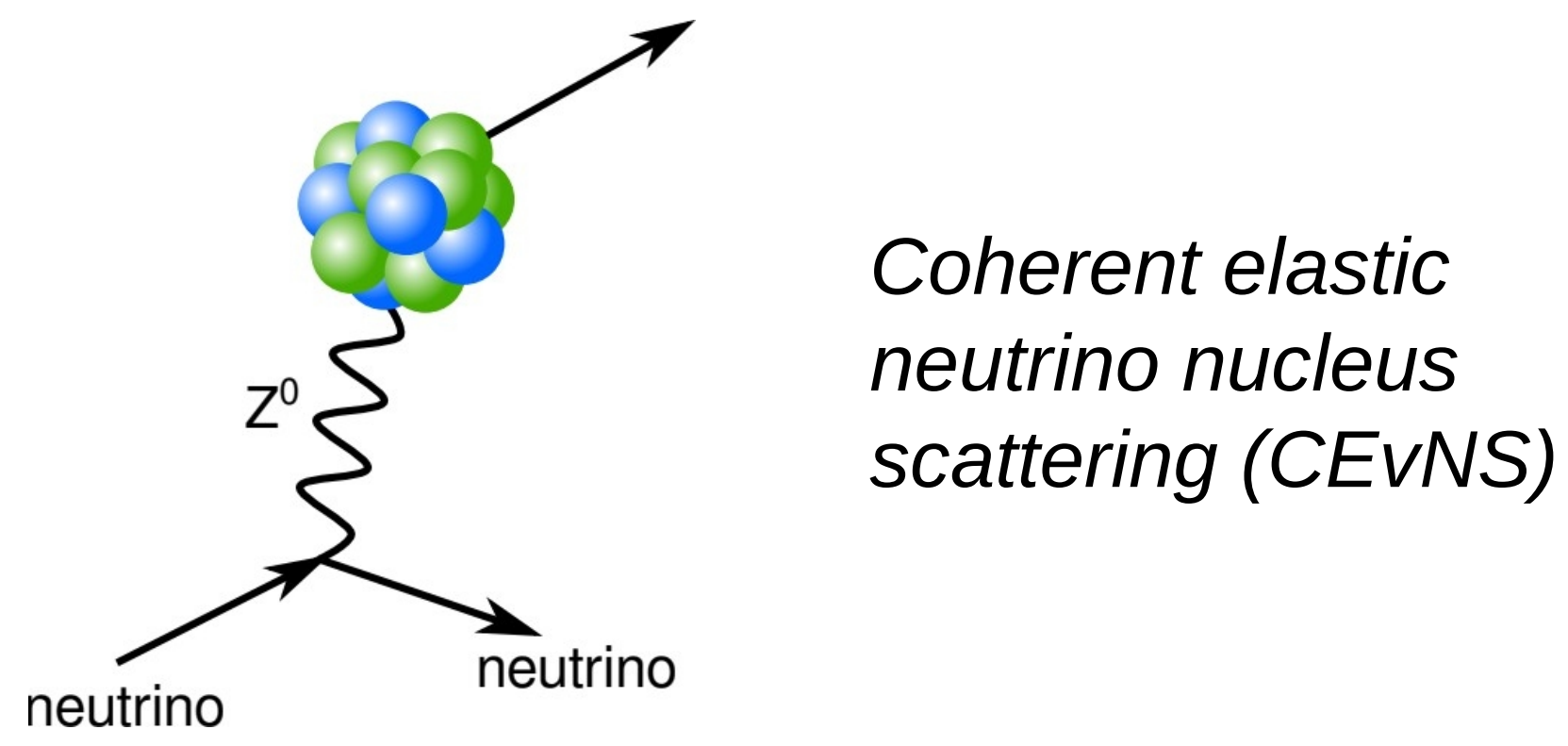


# CONUS results at the Brokdorf reactor

M.Lindner (MPIK Heidelberg) on behalf of the CONUS Collaboration

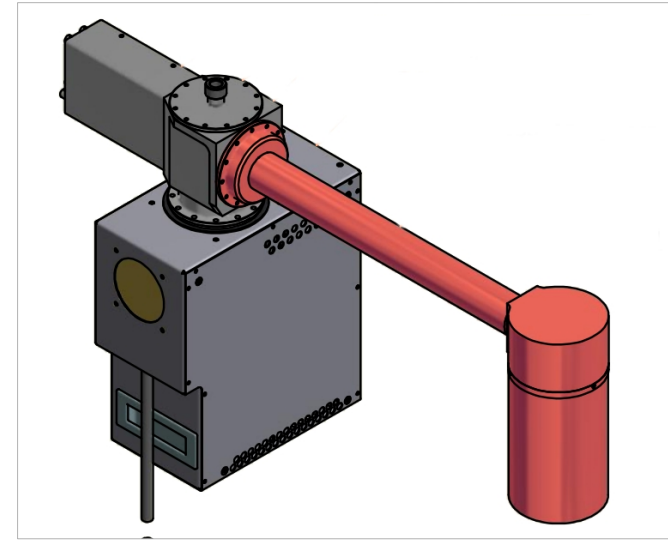
## Neutrino reaction



Cross-section scales with number of neutrons squared, but low energy nuclear recoil experimentally challenging

## Concept

4 x 1 kg point contact HPGe spectrometer

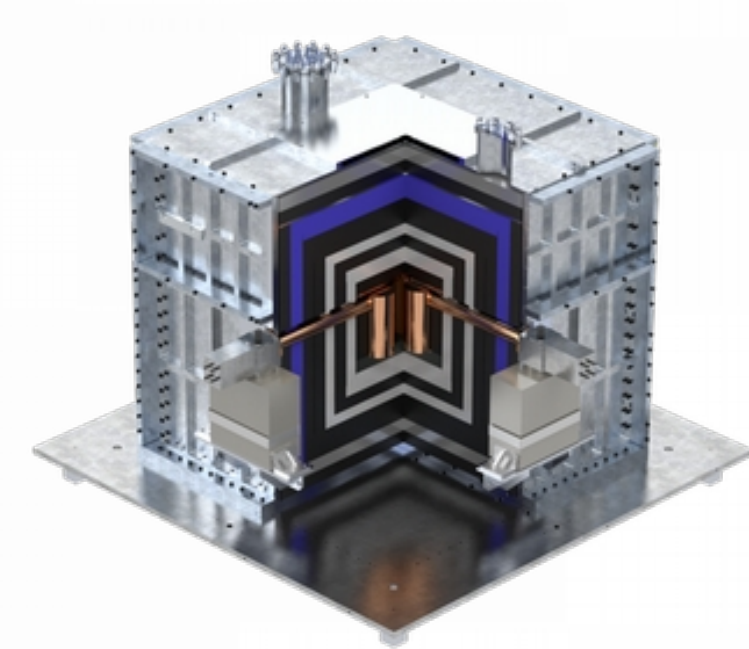


Low threshold

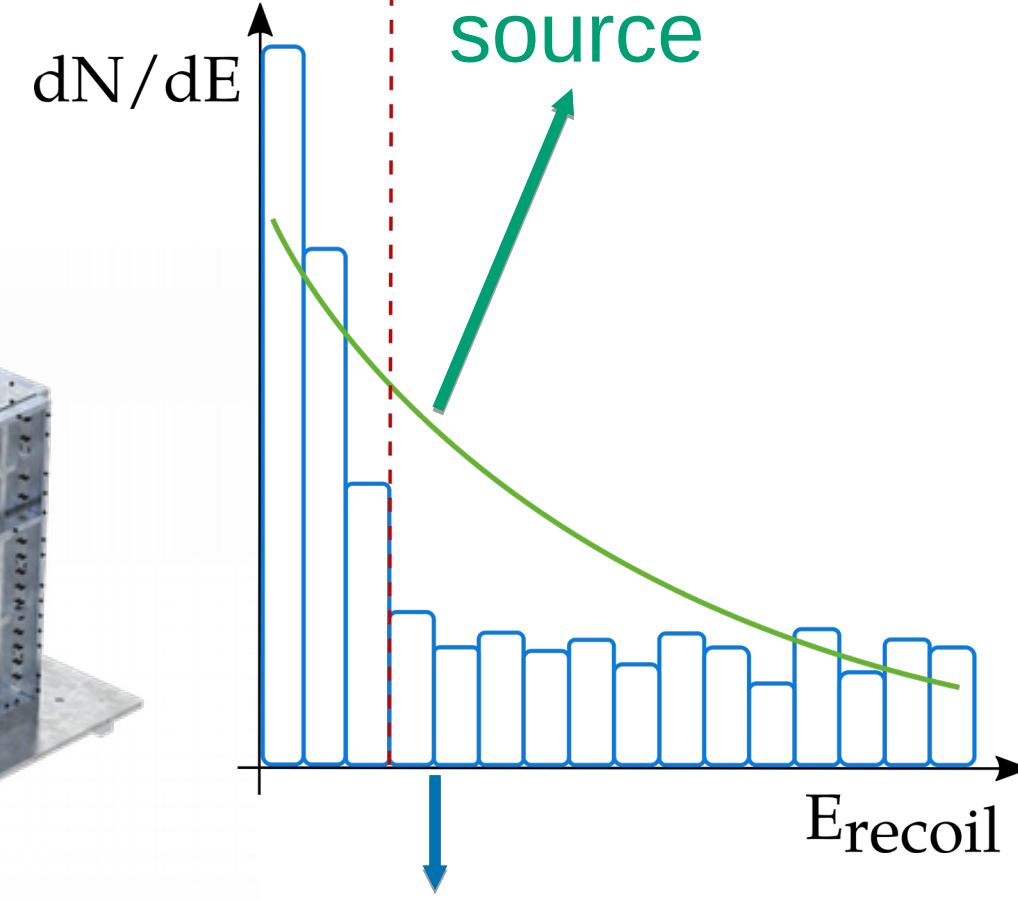
Nuclear power plant (Brokdorf, KBR)



Strong (anti)neutrino source

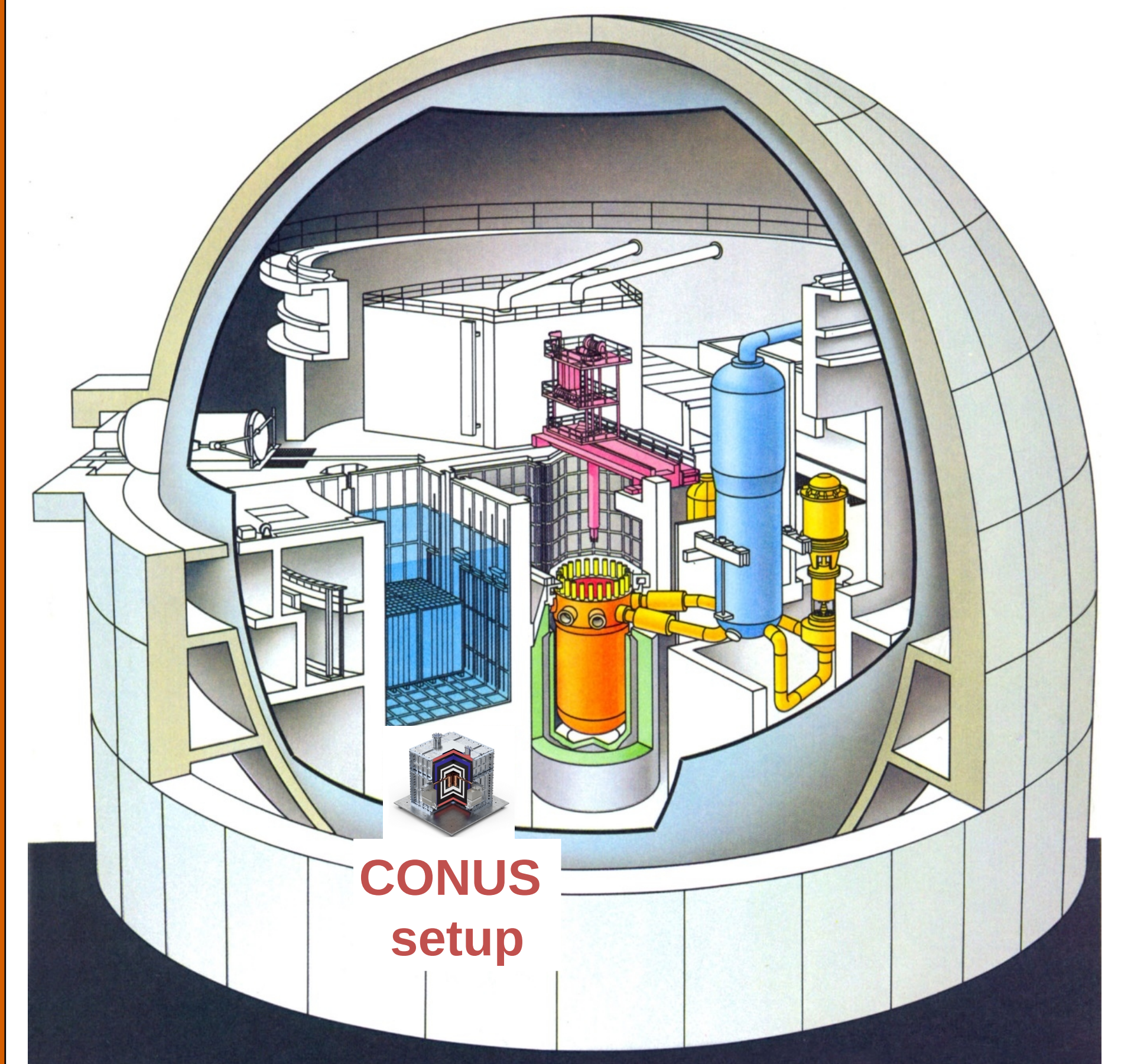


Shield (11 t, 1.6 m<sup>3</sup>): Pb, PE, active muon veto



Low background

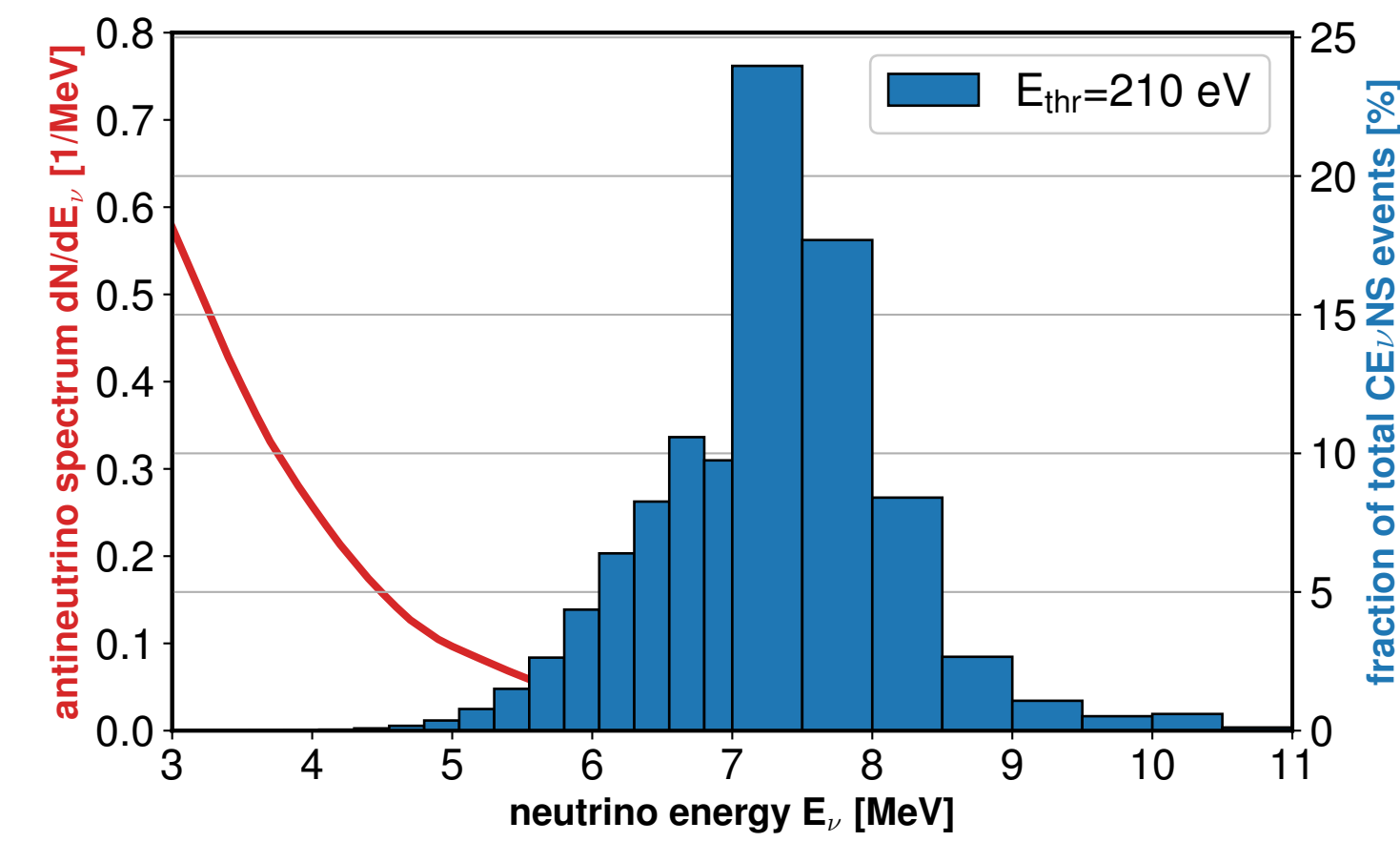
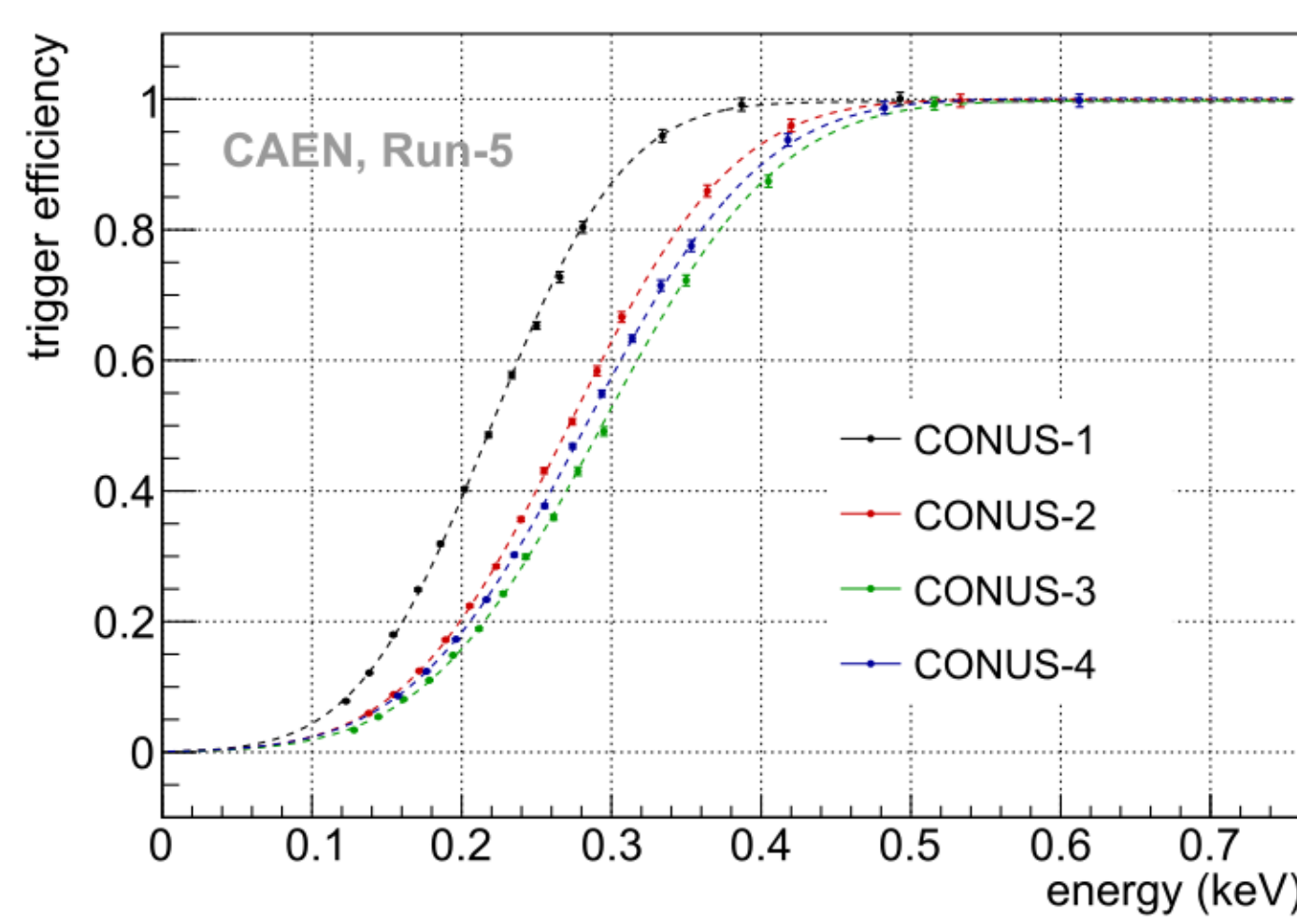
## Experimental site



\* Distance: 17.1 m, Thermal power: 3.9 GWth  
\* Overburden: 10-45 m w.e.  
\* Reactor stopped operation end of 2021...

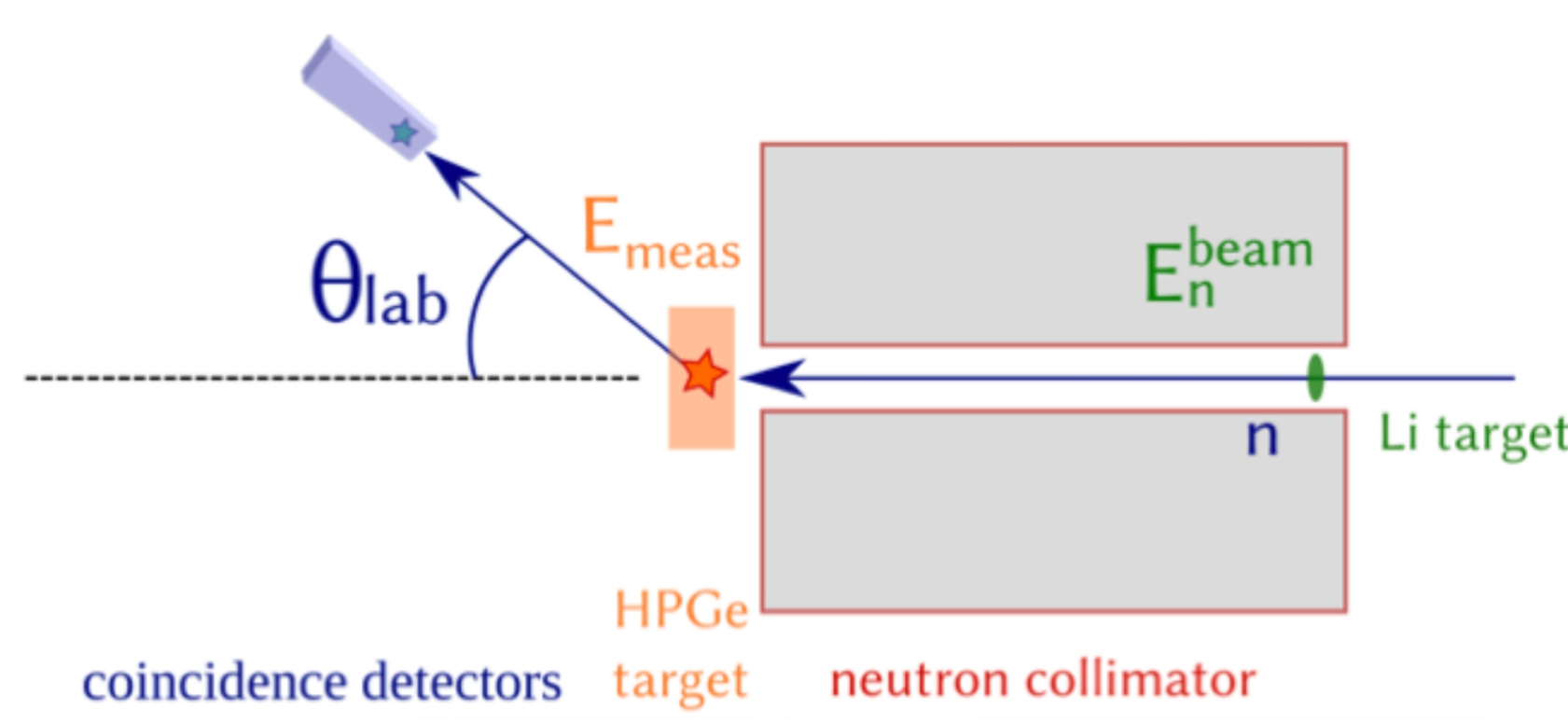
## Signal prediction

Using data-based approach (Daya Bay) with an analysis threshold of 210 eV<sub>ee</sub> in the final phase at Brokdorf

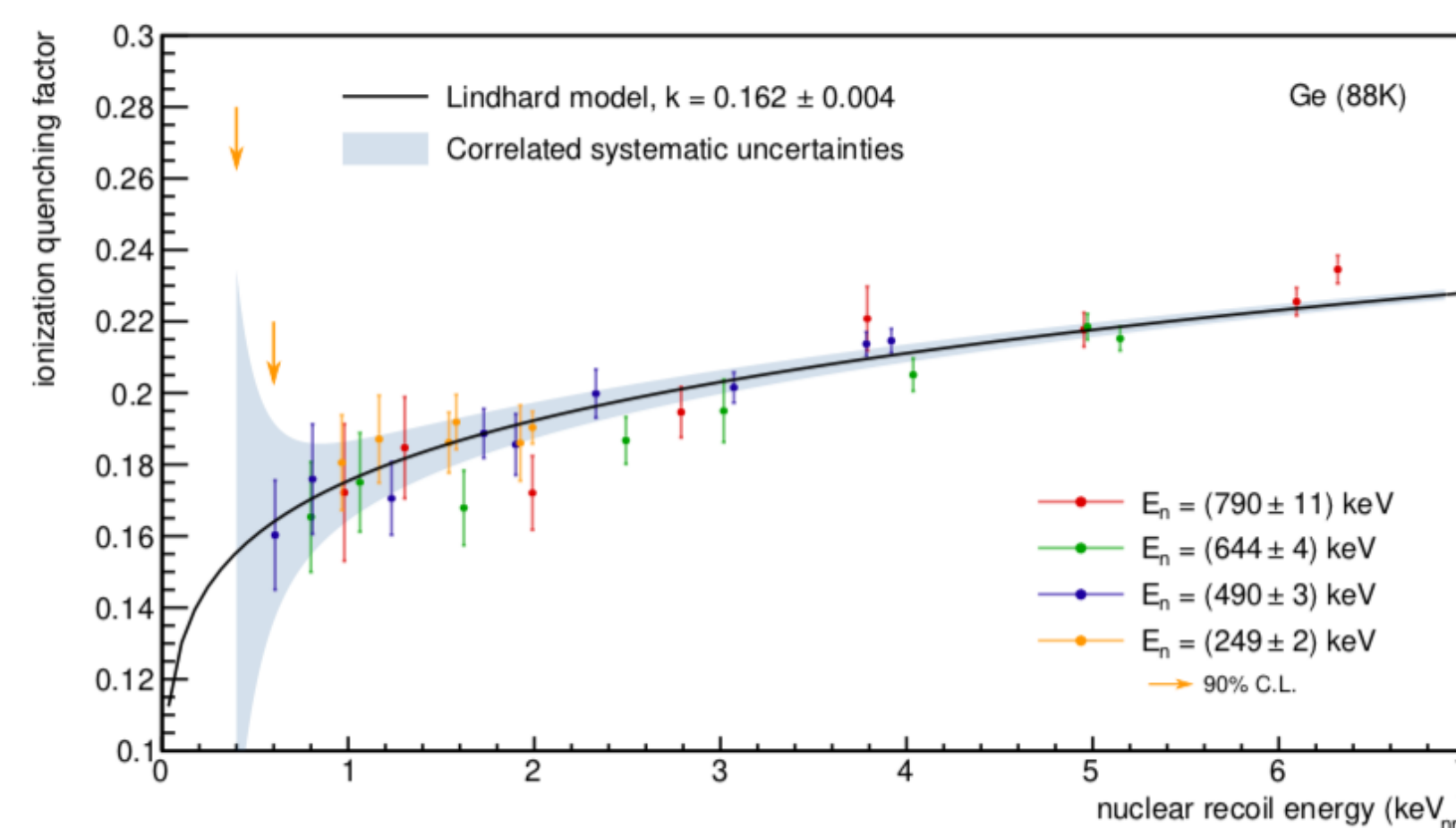


CONUS Coll., EPJ C 84:139 (2024) / CONUS Coll., arXiv 2401.07684 (2024)

## Quenching



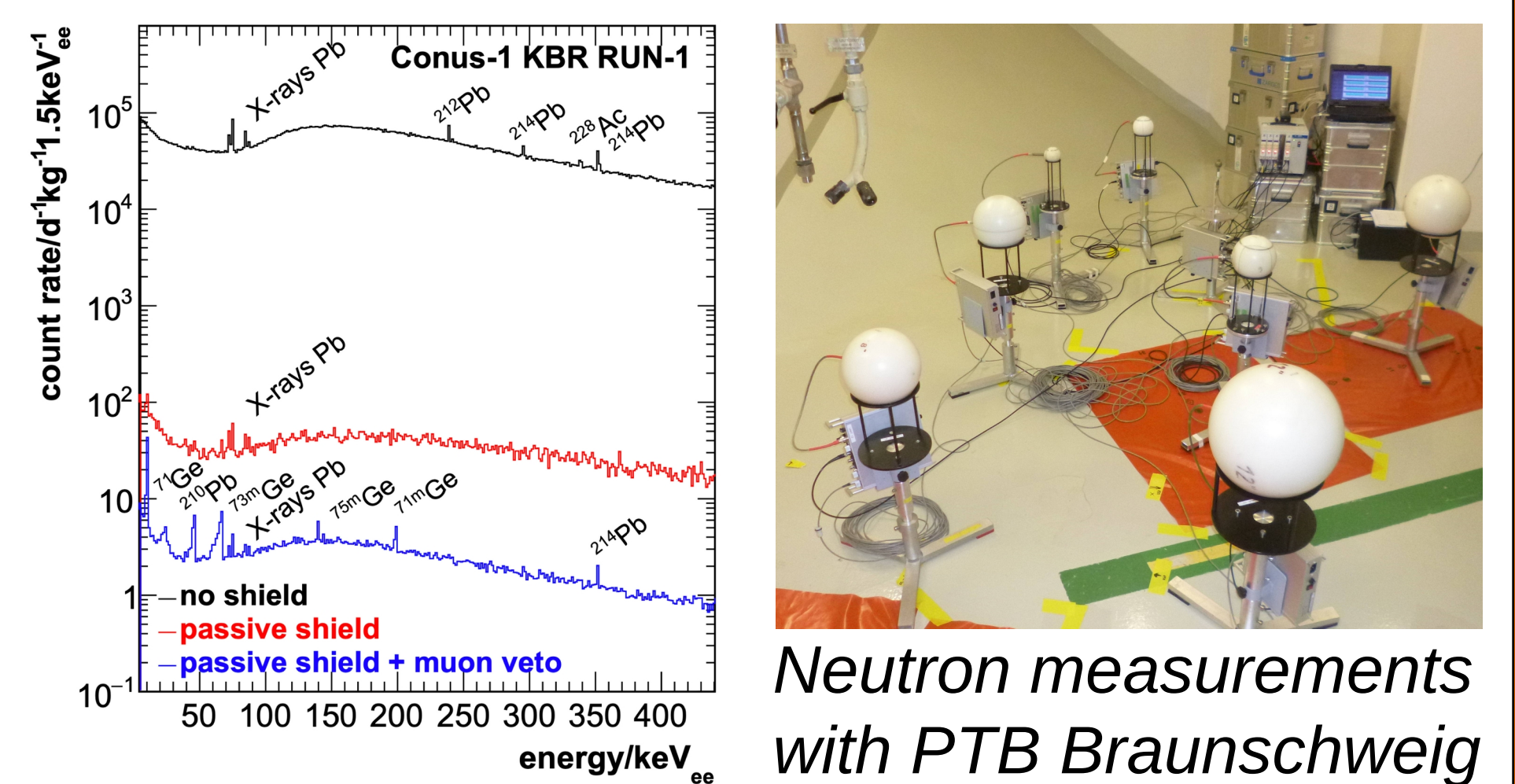
Rather model-independent measurement method at PTB Braunschweig (neutron beam)



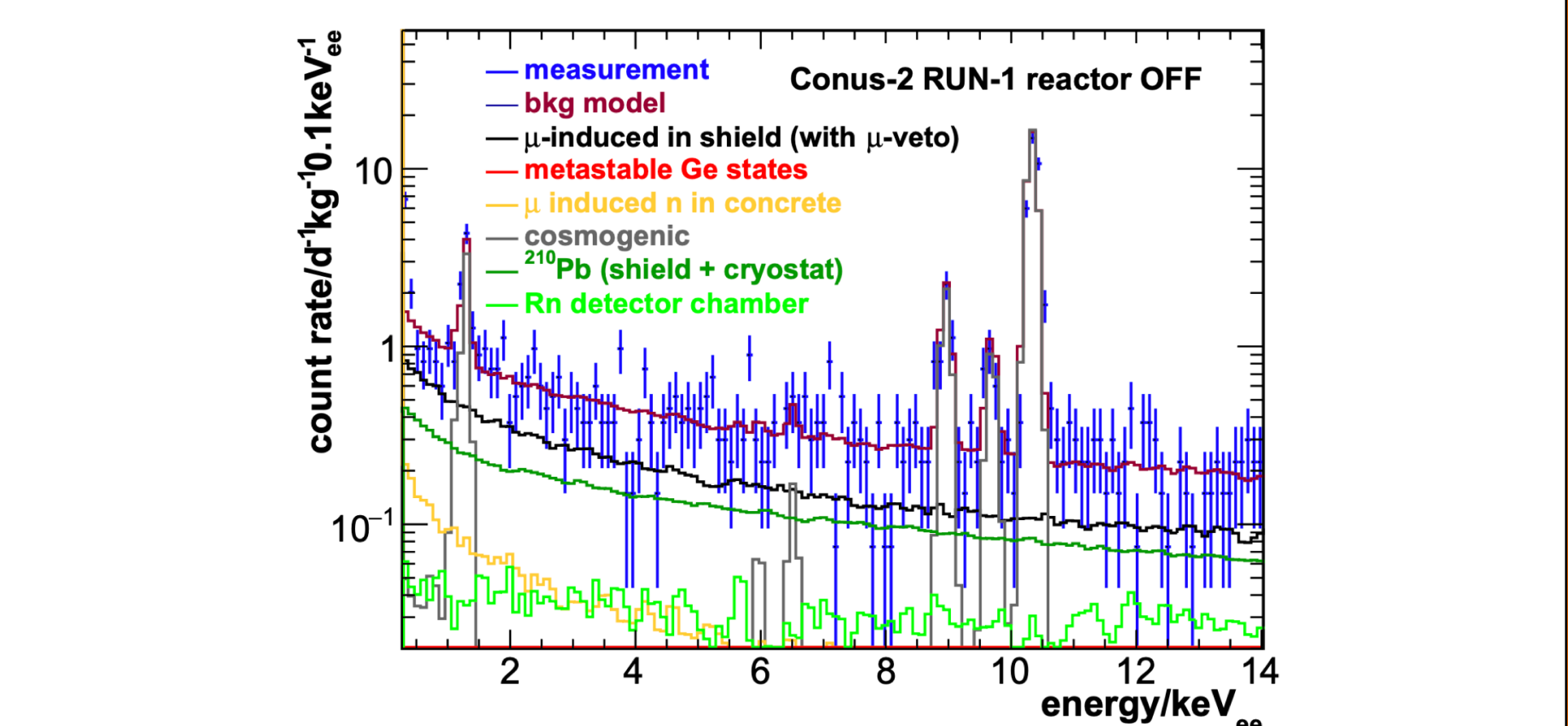
Result consistent with Lindhard theory

Bonhomme et al., EPJ C 82:815 (2022)

## Background



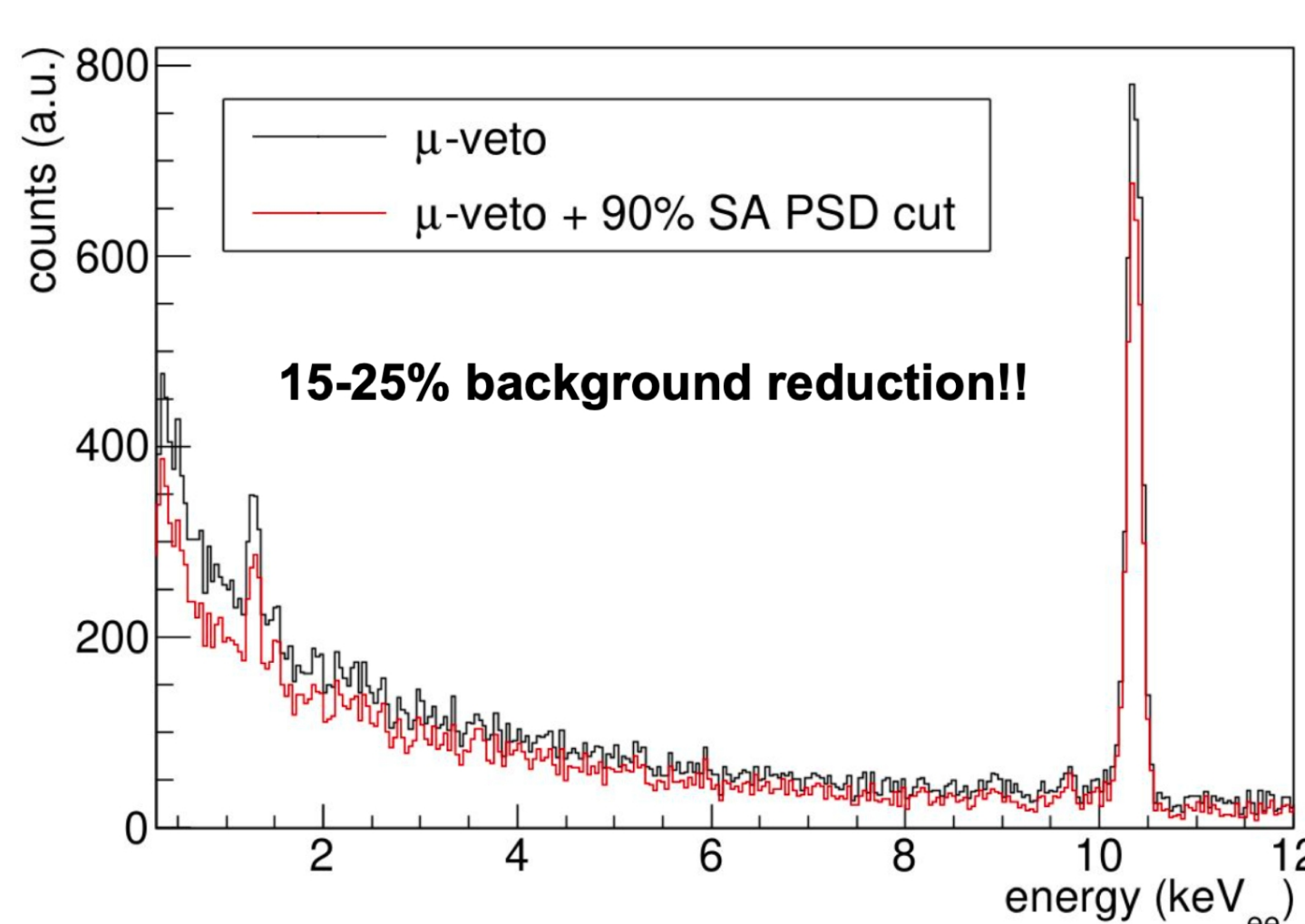
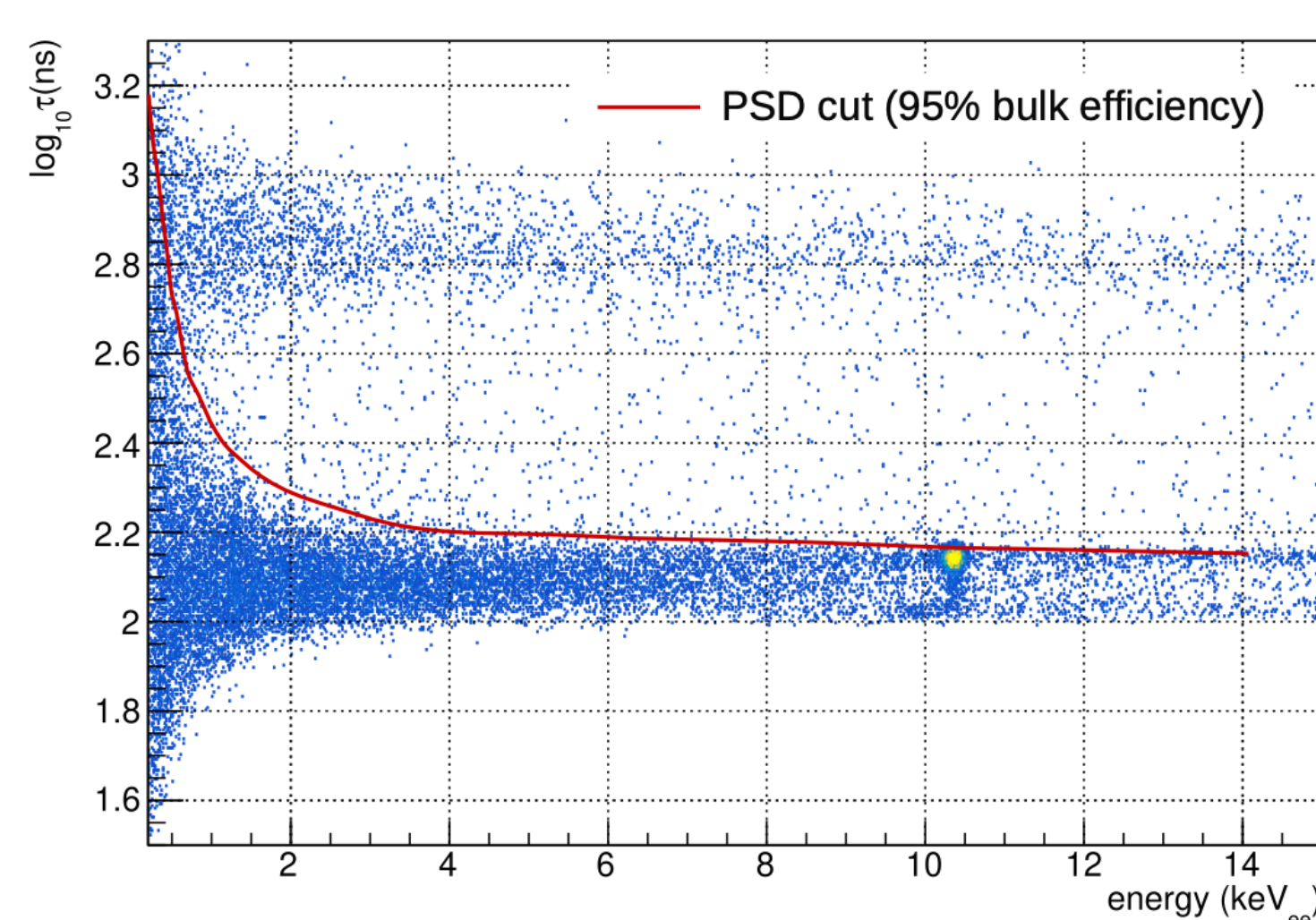
Neutron measurements with PTB Braunschweig



Background described by validated MC simulations with the muon induced component as dominating contribution

CONUS Coll., EPJ C 83:195 (2023) / CONUS Coll., EPJ C 79:699 (2019)

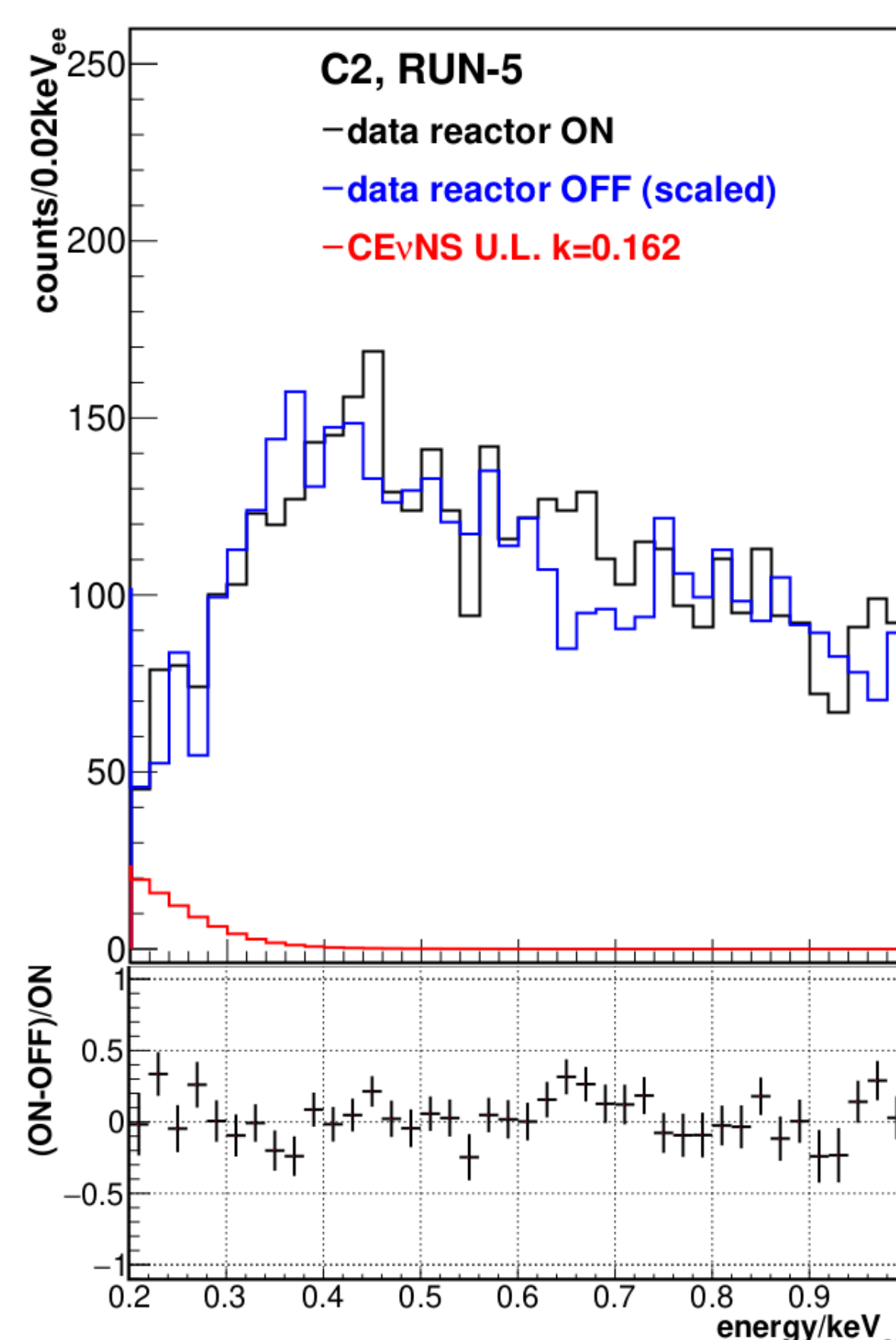
## Pulse shape discrimination



CONUS Coll., EPJ C 84:139 (2024)

## Result likelihood fit

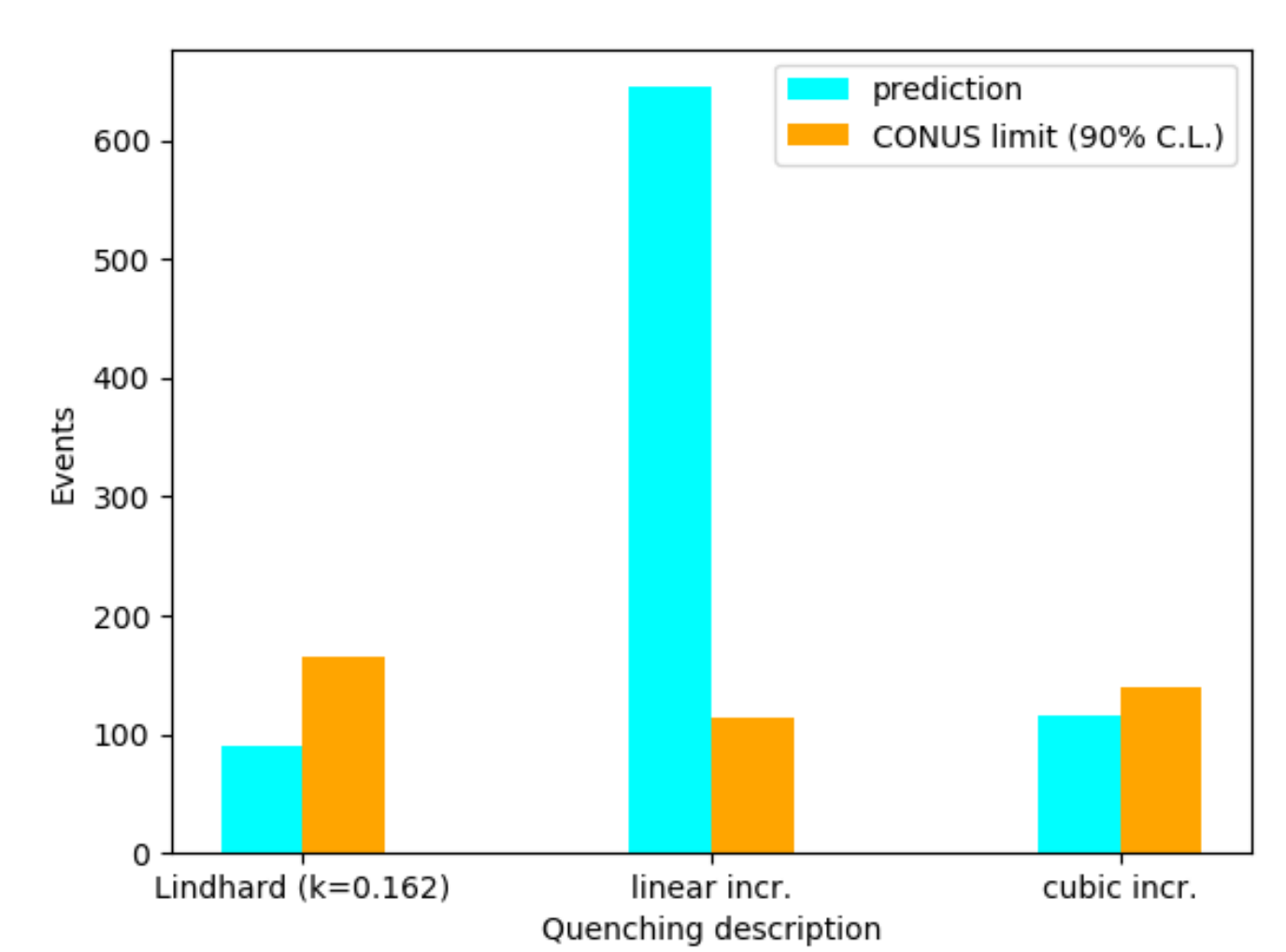
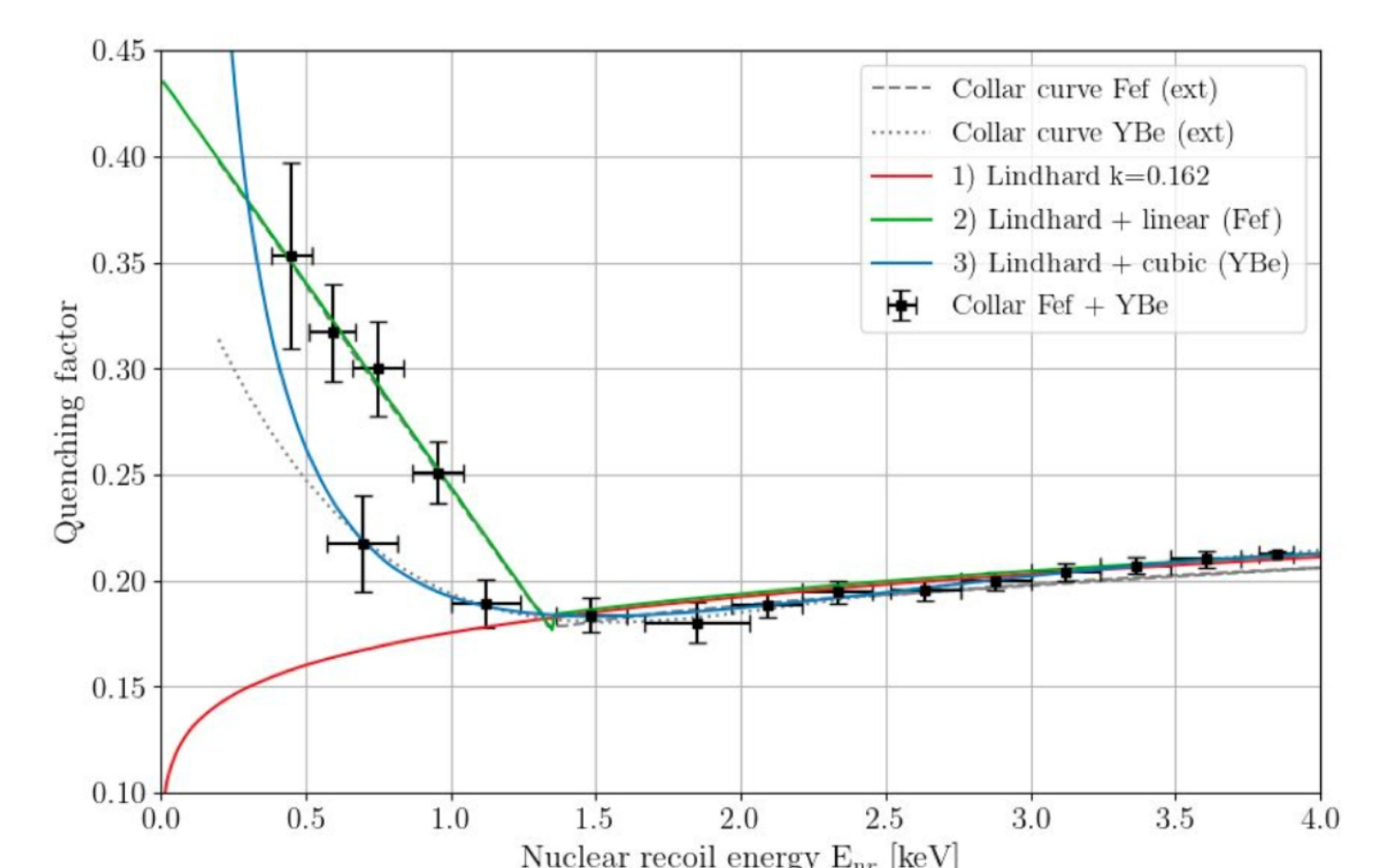
Run-5 (2021/22) exposure includes 426 kg d reactor-on and 272 kg d reactor-off data (collected with 3 detector)



Limit of the combined fit: factor < 2 below SM prediction

CONUS Coll., arXiv 2401.07684 (2024)

## Other quenching descriptions



CONUS Coll., arXiv 2401.07684 (2024)