

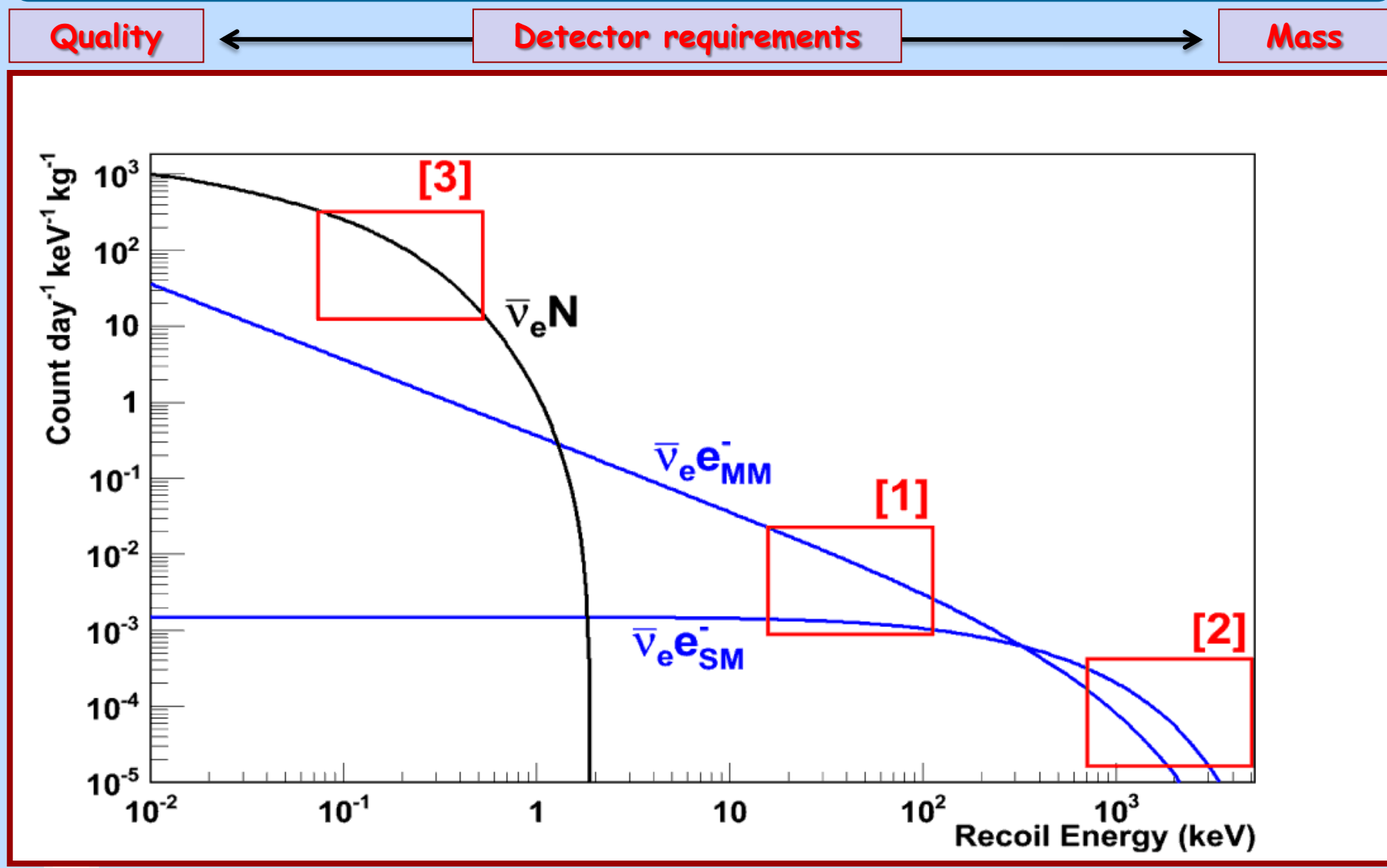
Low Energy Neutrino And Dark Matter Physics With Sub-KeV Germanium

Lakhwinder Singh (ON BEHALF OF TEXONO COLLABORATION)

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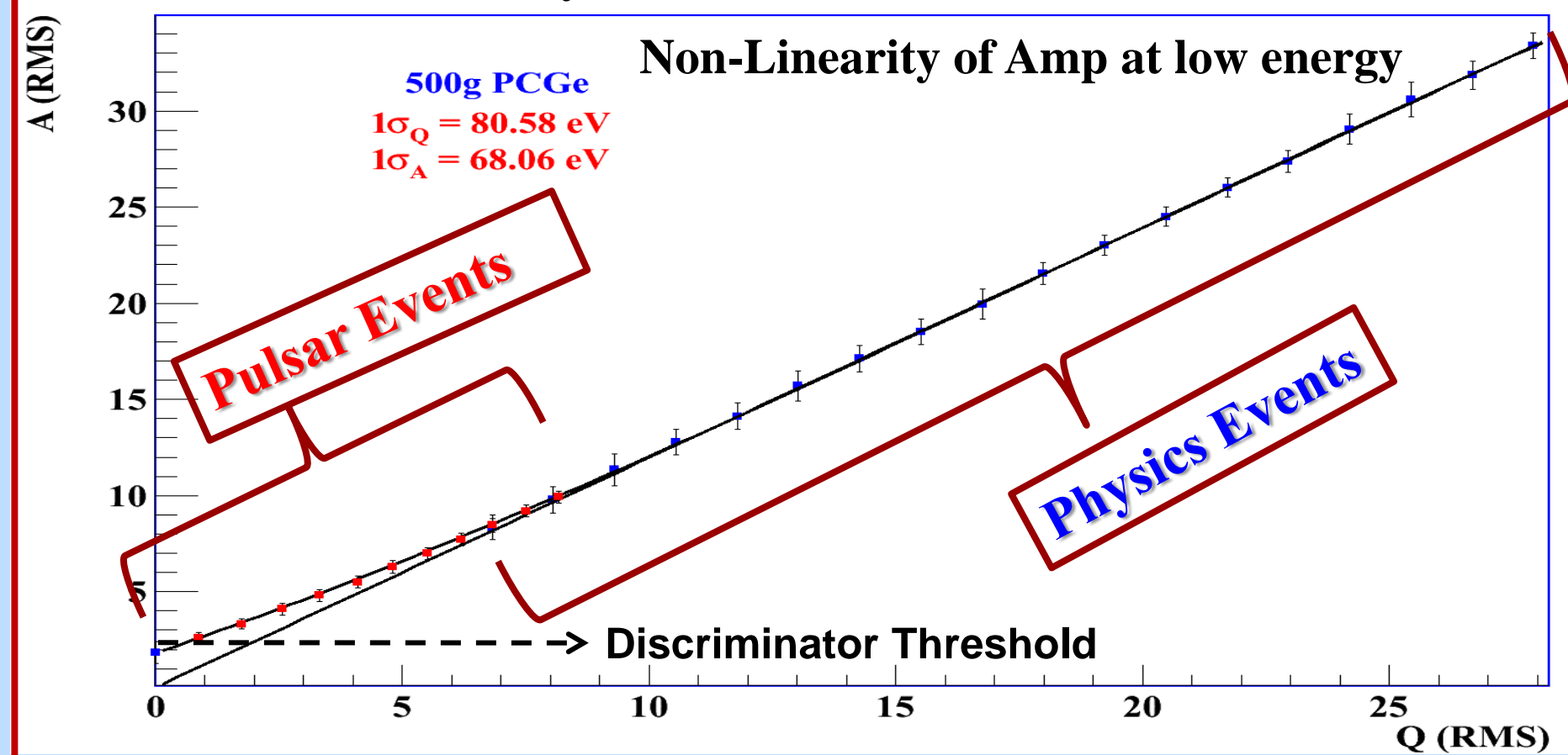
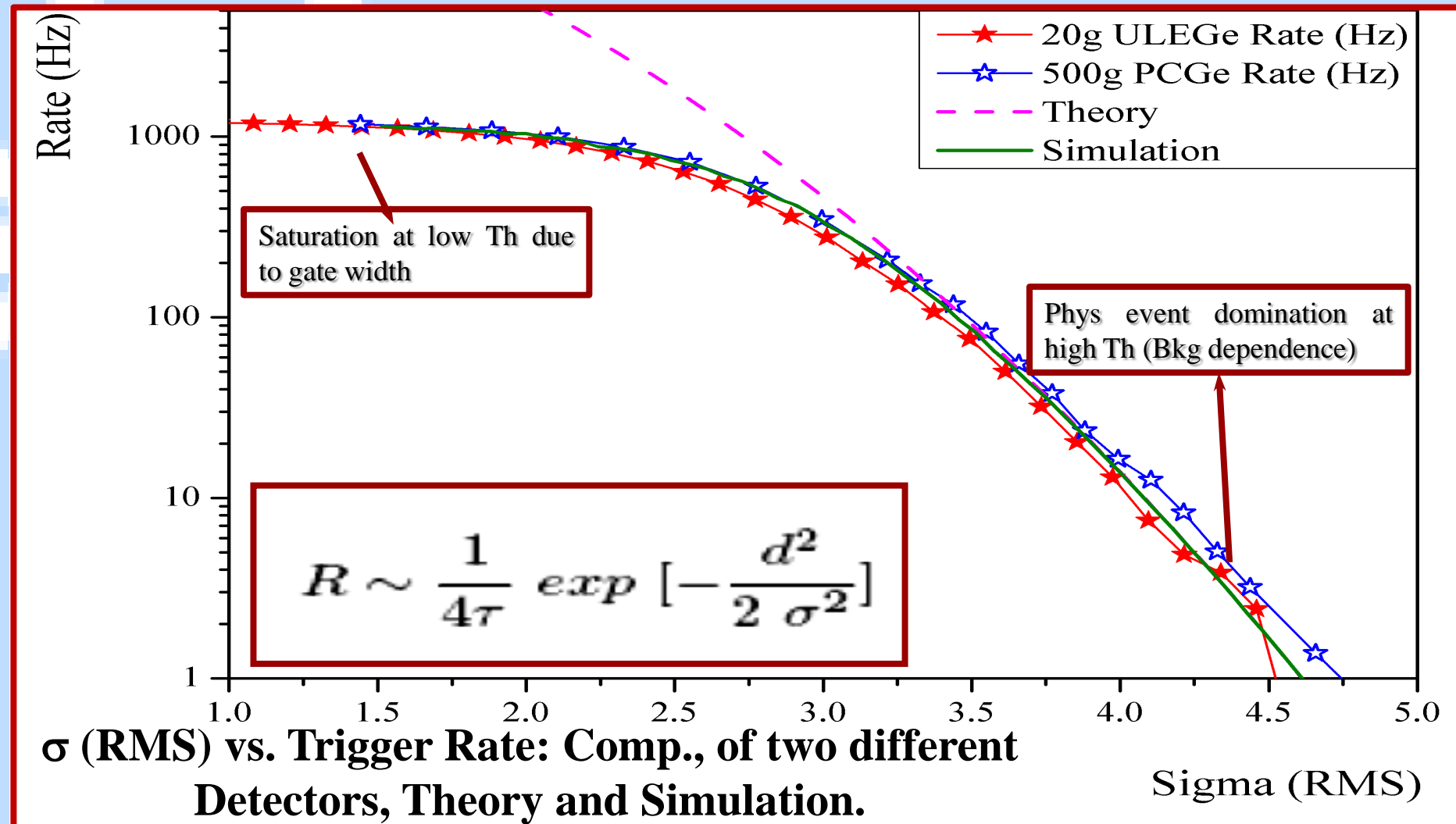


Motivation

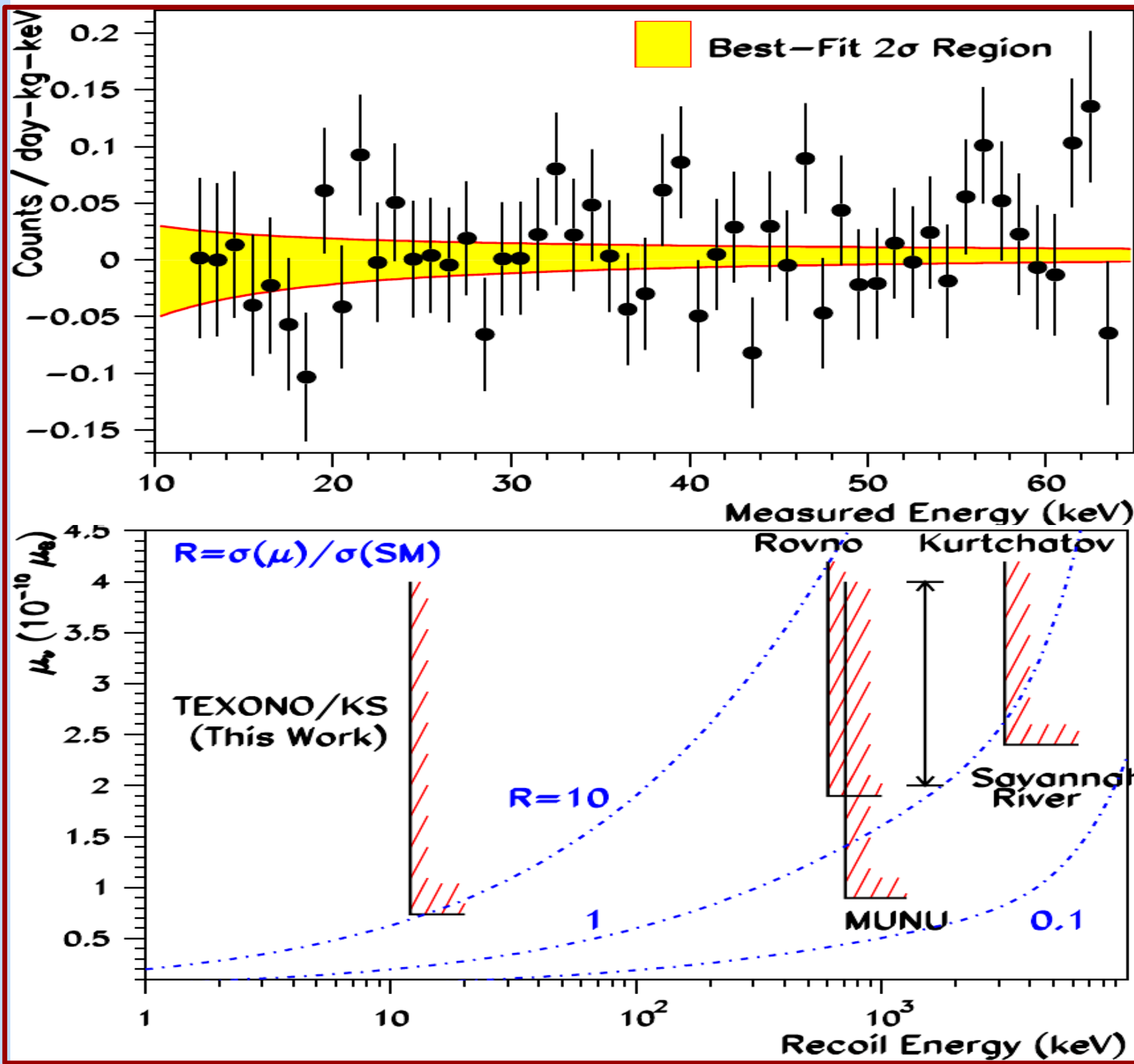


- [1] Magnetic Moment Search at ~ 10 keV \rightarrow PRL 2003, PRD 2007
- [2] Cross-Section and EW Parameters measurement at MeV range \rightarrow PRD 2010
- [3] νN Coherent Scattering & WIMP Search at sub keV range

PCGe 500g Detector

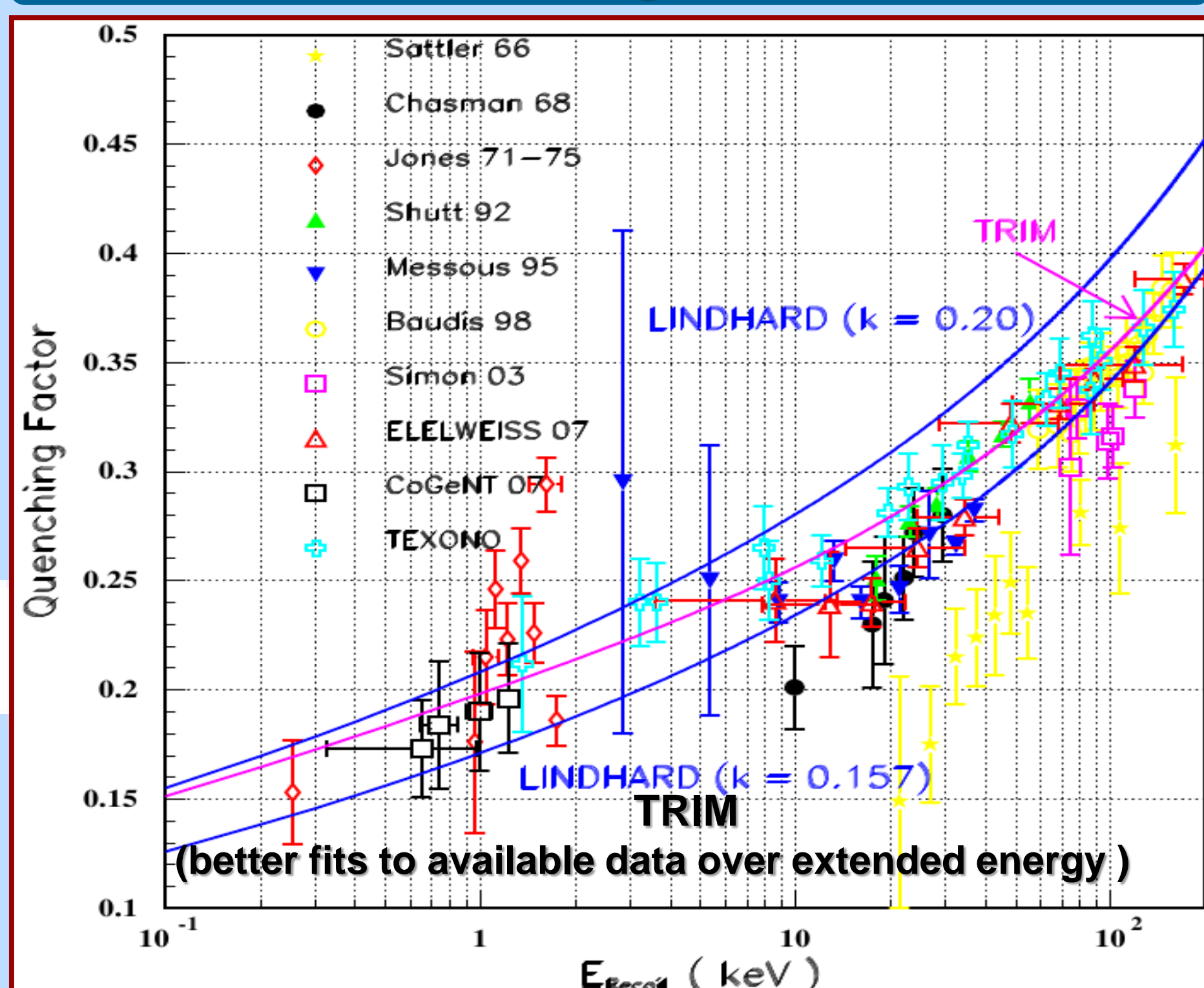


Neutrino Magnetic Moment

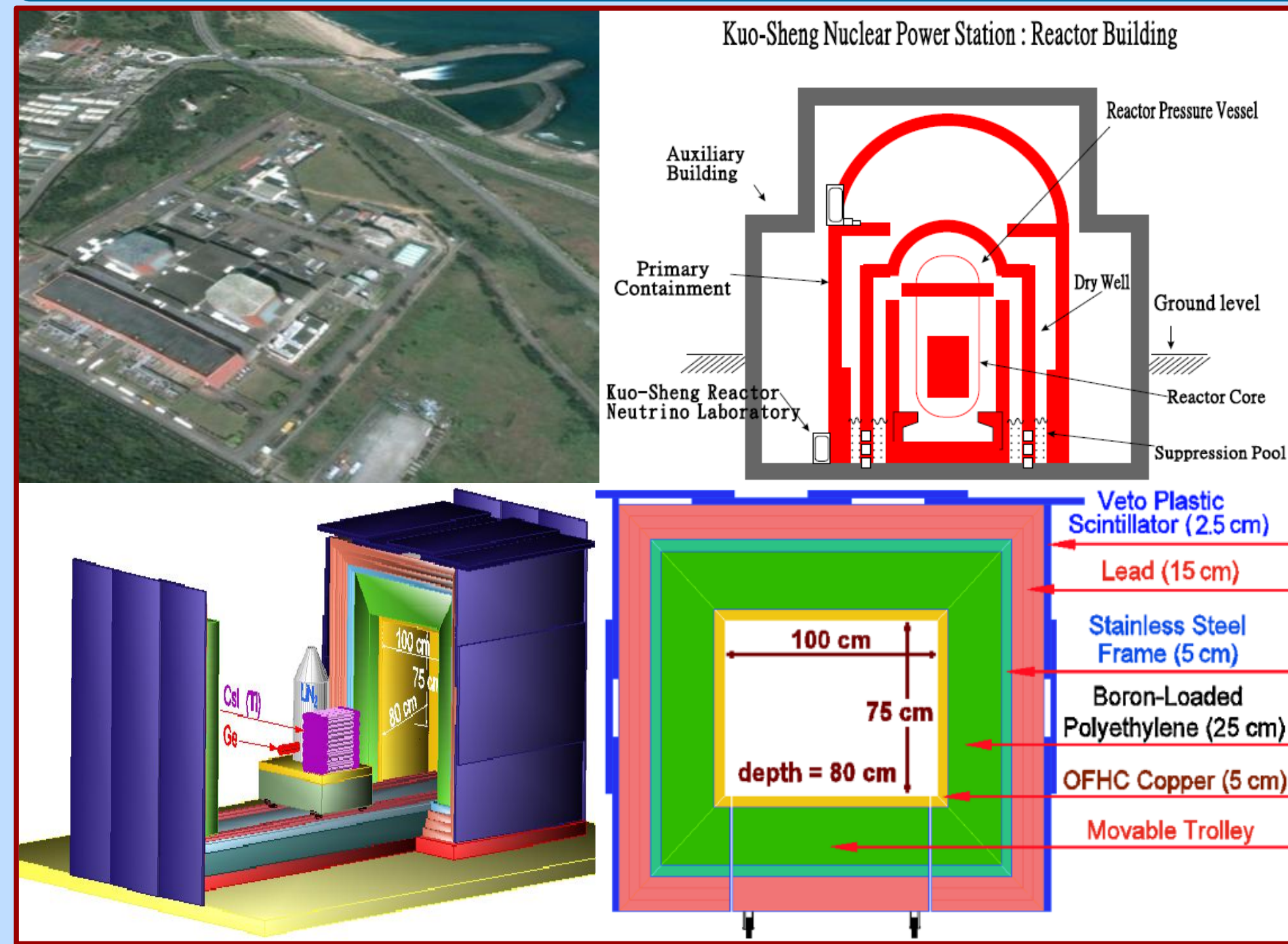


$\mu < 7.4 \times 10^{-11} \mu_B$ 90% C.L. ref: [PRD 75 2007]

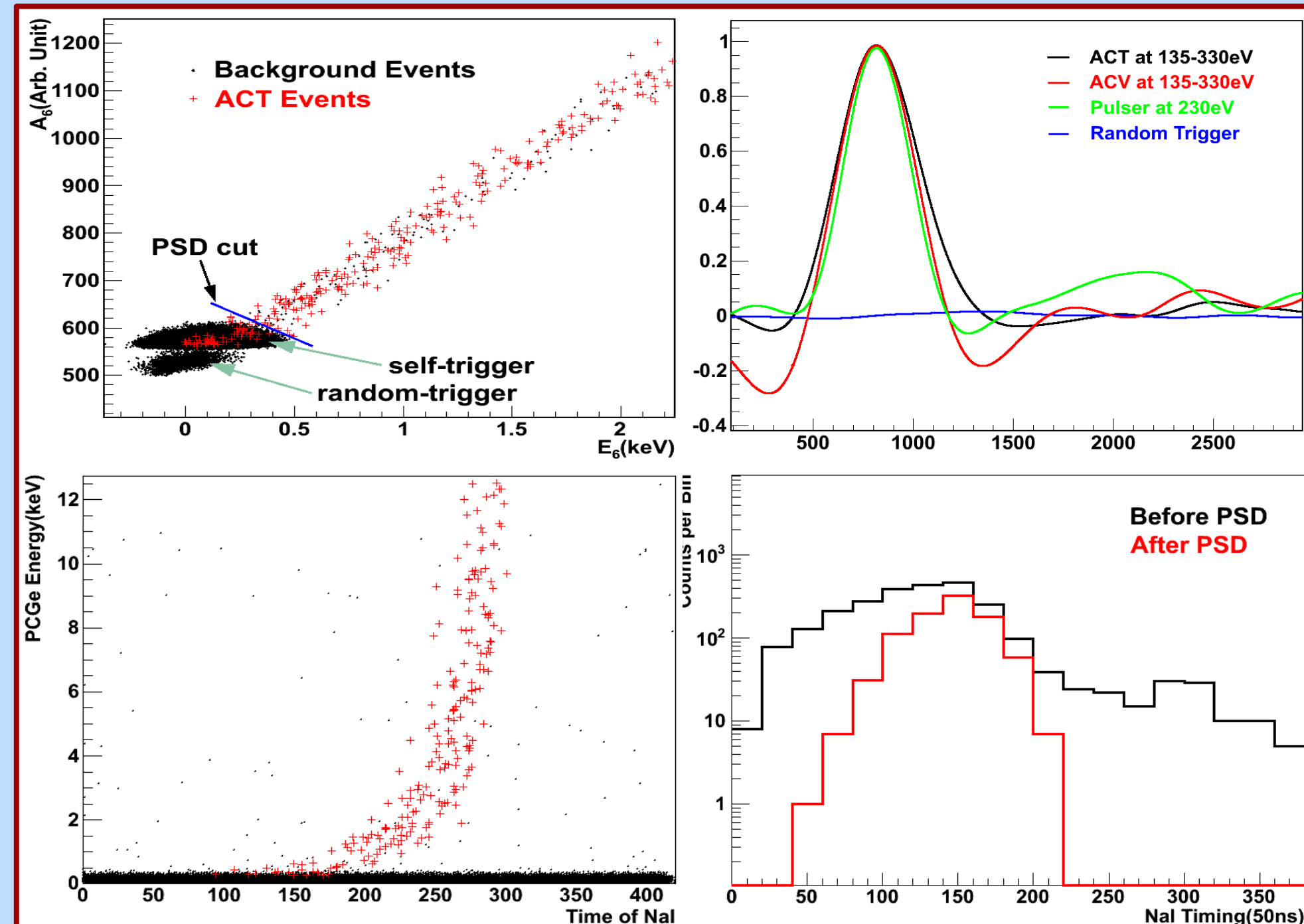
Quenching Factor



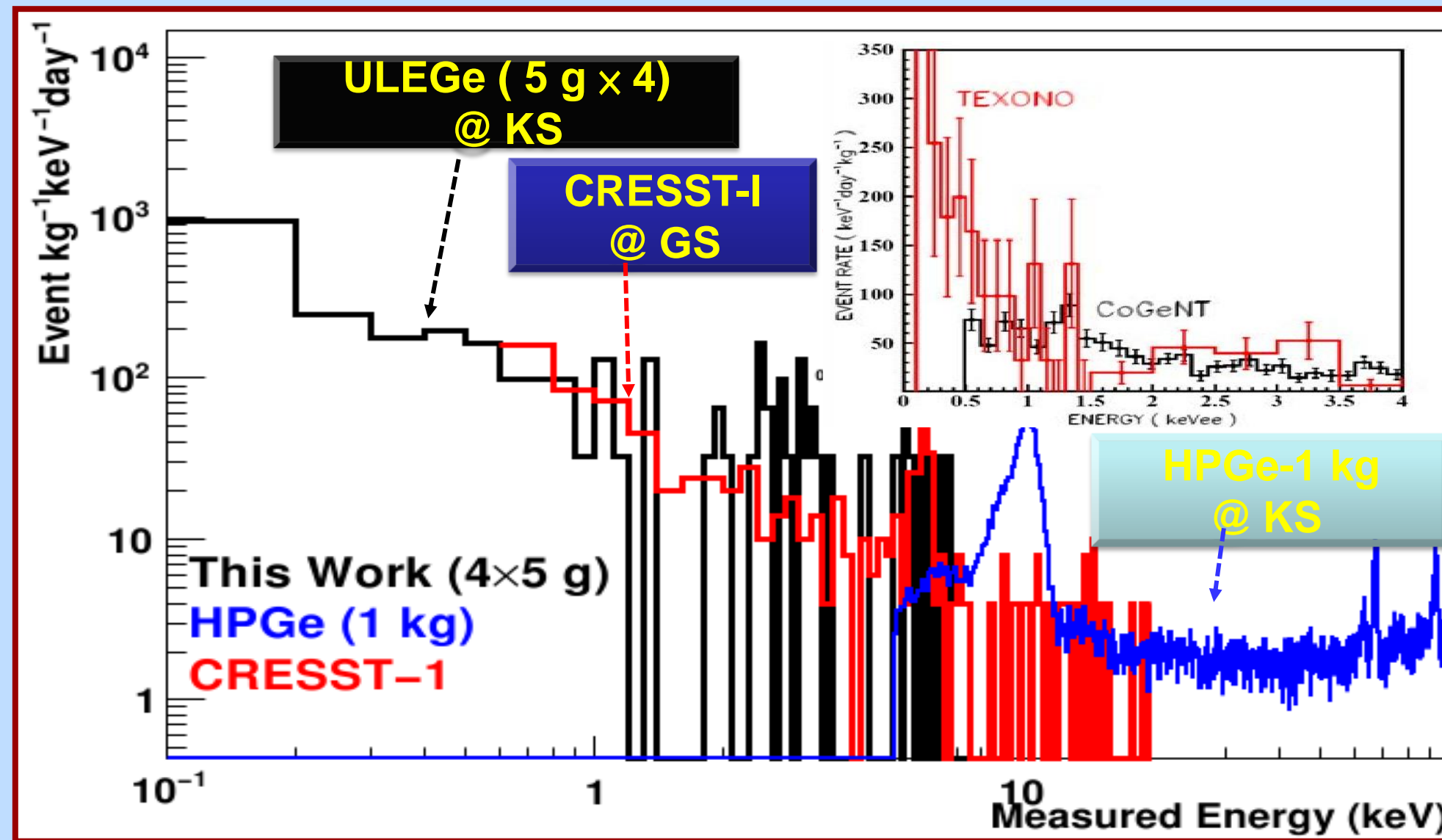
Kuo Sheng [國聖] Reactor Neutrino Laboratory



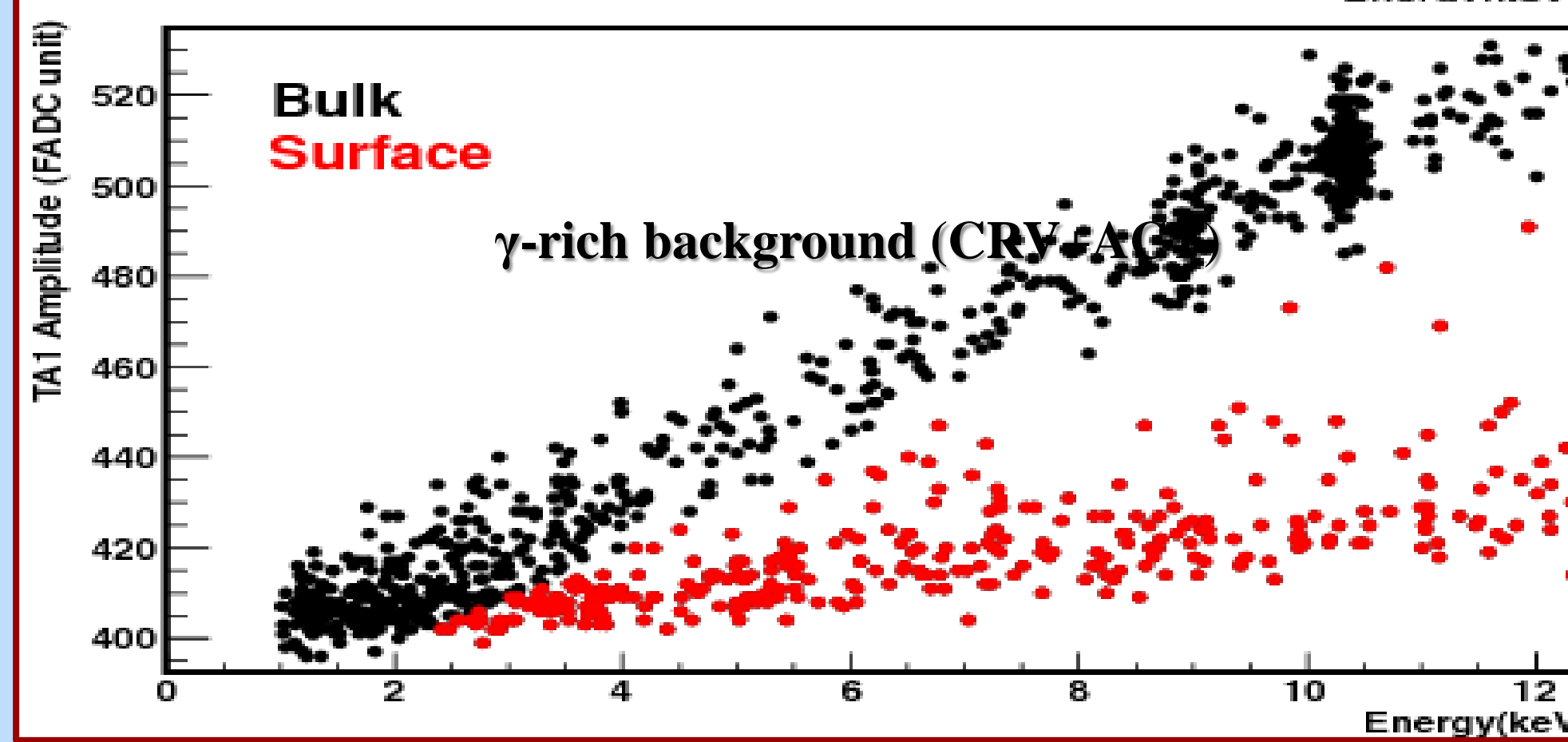
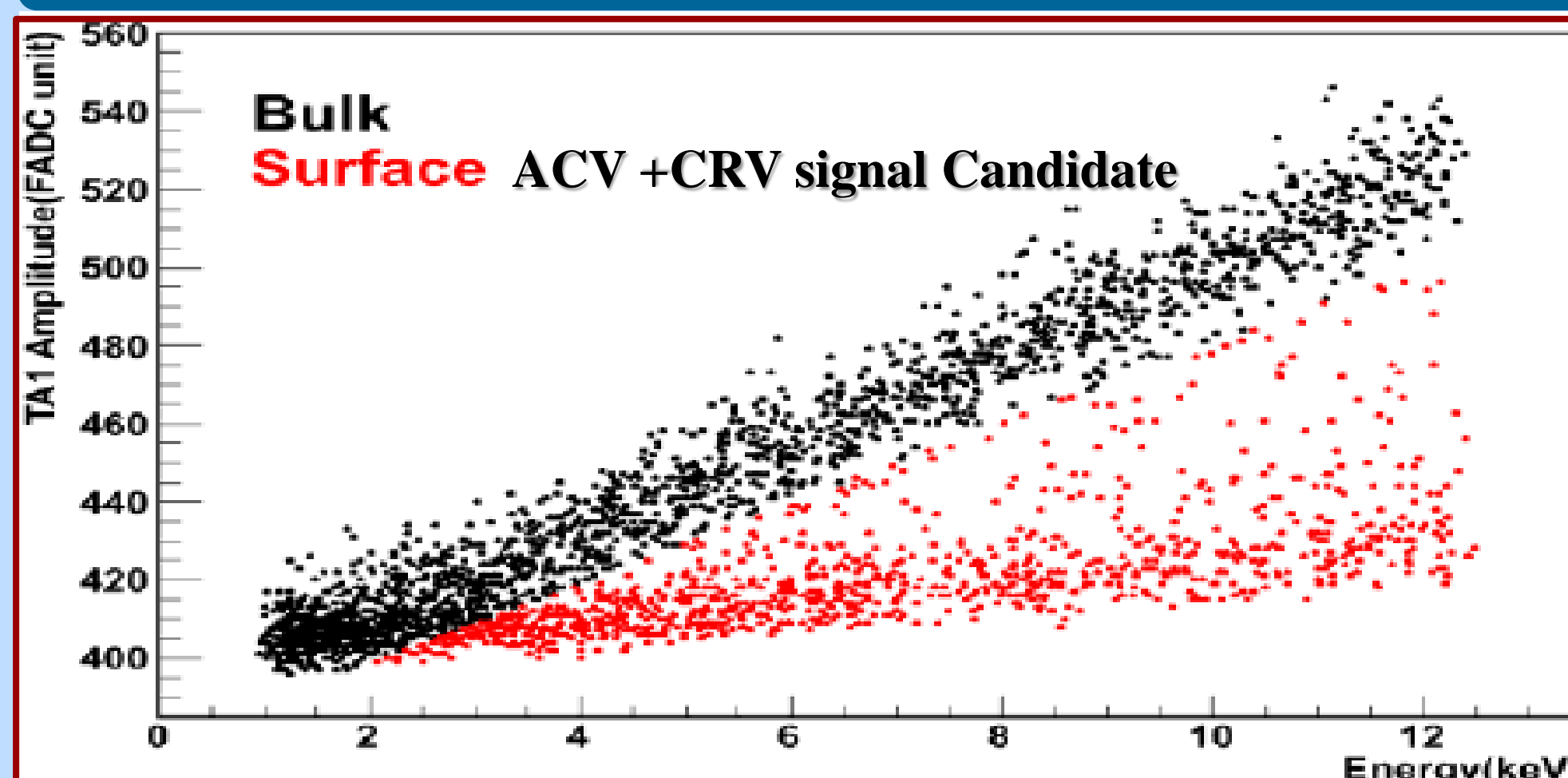
PCGe 500 g \rightarrow PSD Cut (Preliminary)



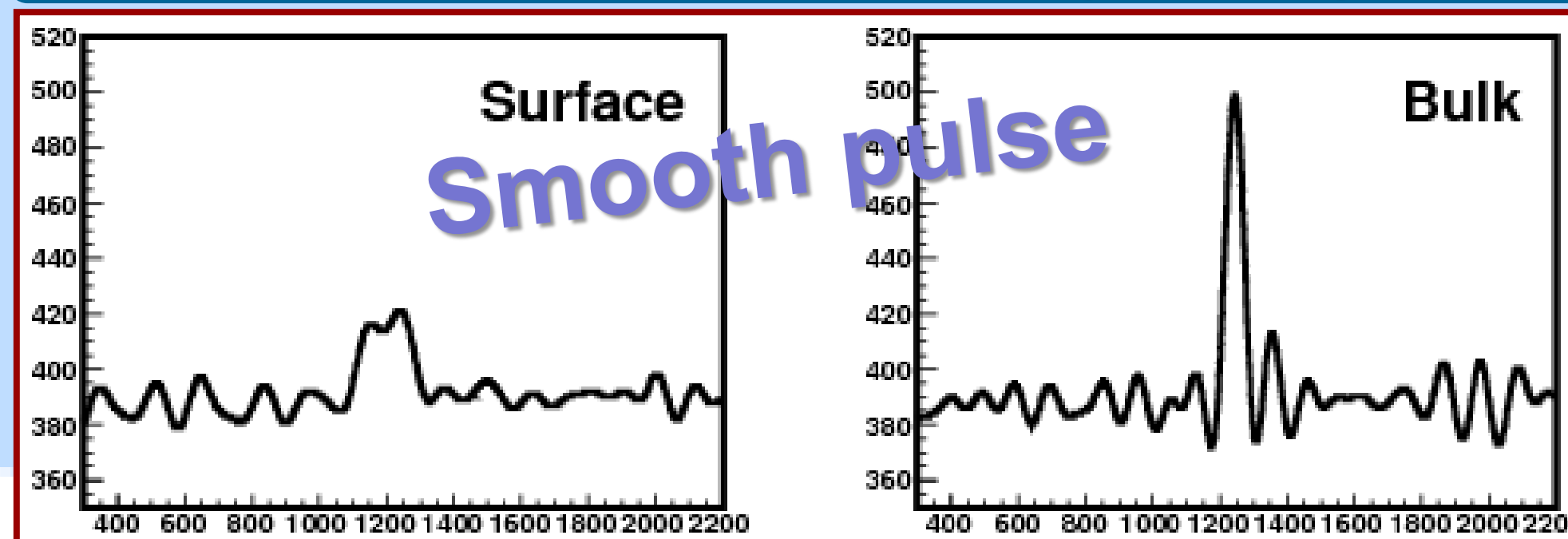
Sub-keV Bkg Measurements & Comps.



Bulk and Surface Events Distribution

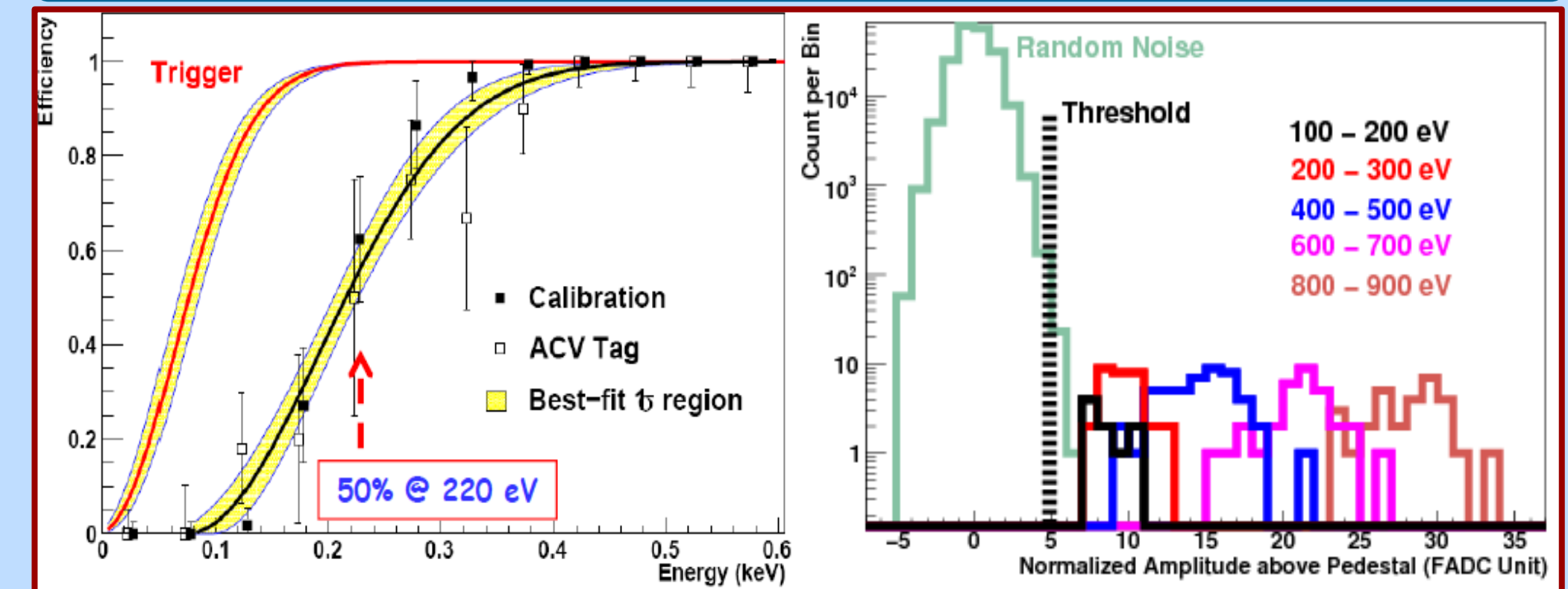


Surface and Bulk events (> 2 keV)



Discrimination between Surface and Bulk event with Timing Amp.

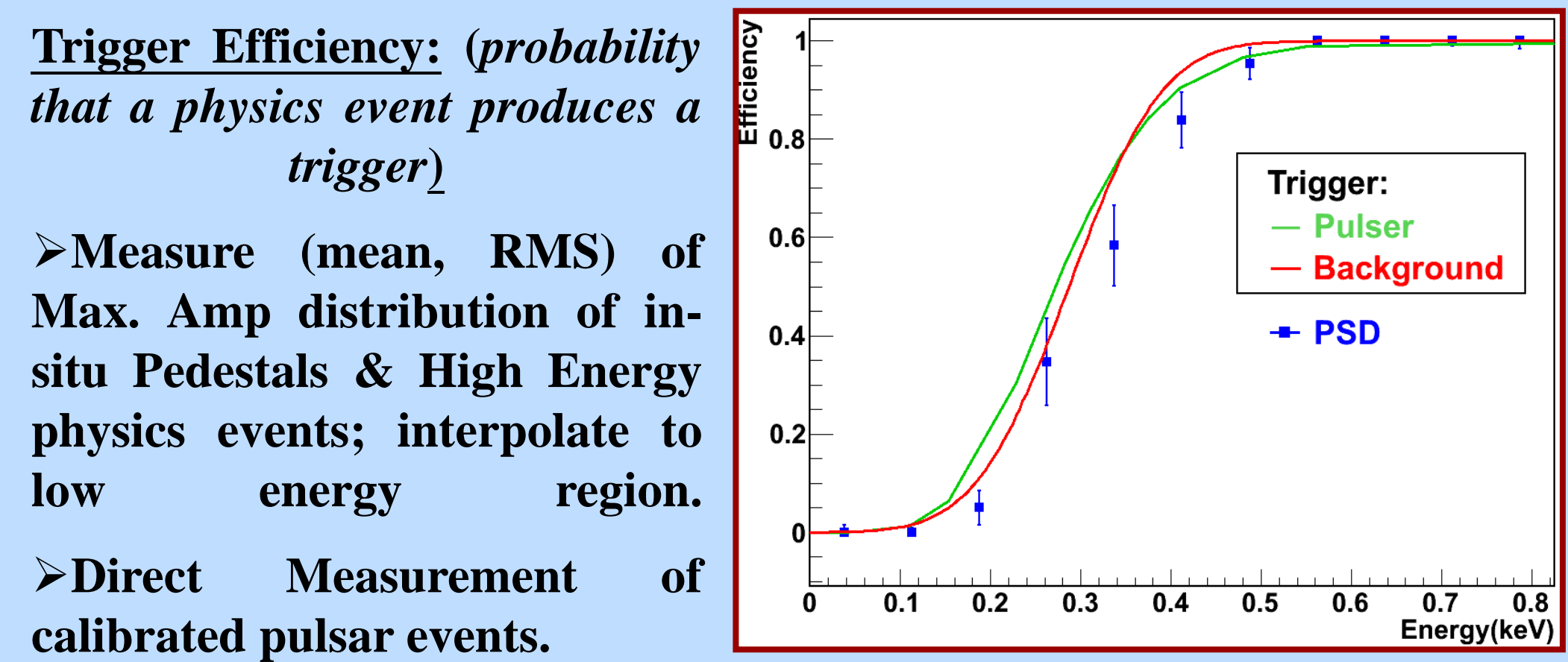
4x5 g Detector: Threshold & Trigger Efficiency



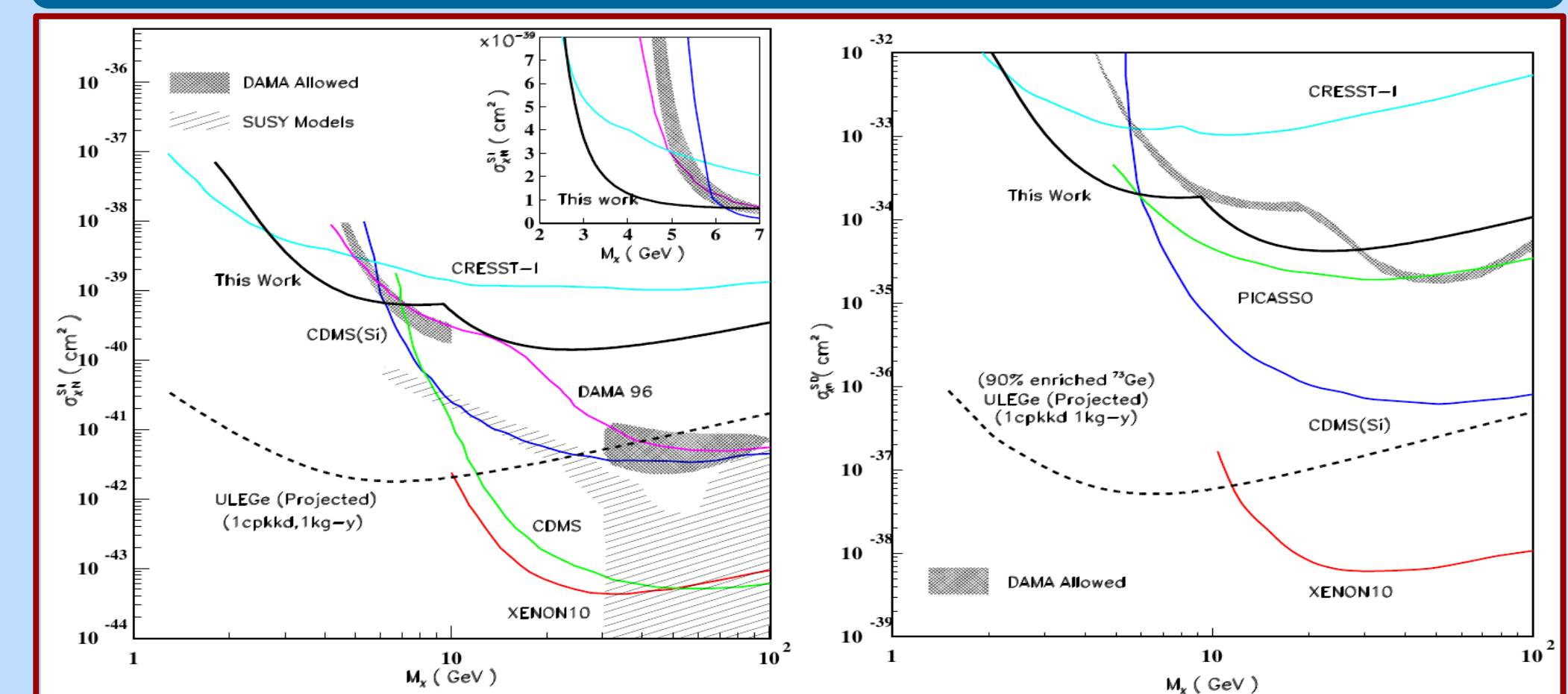
DAQ threshold at $\sim 4.3\sigma$ above mean of noise fluctuations minimal DAQ dead time.

Efficiency Evaluation from (mean, RMS) of Max. Amplitude distribution of physics events, test with pulser reference events.

PCGe 500 g, Threshold (Preliminary)



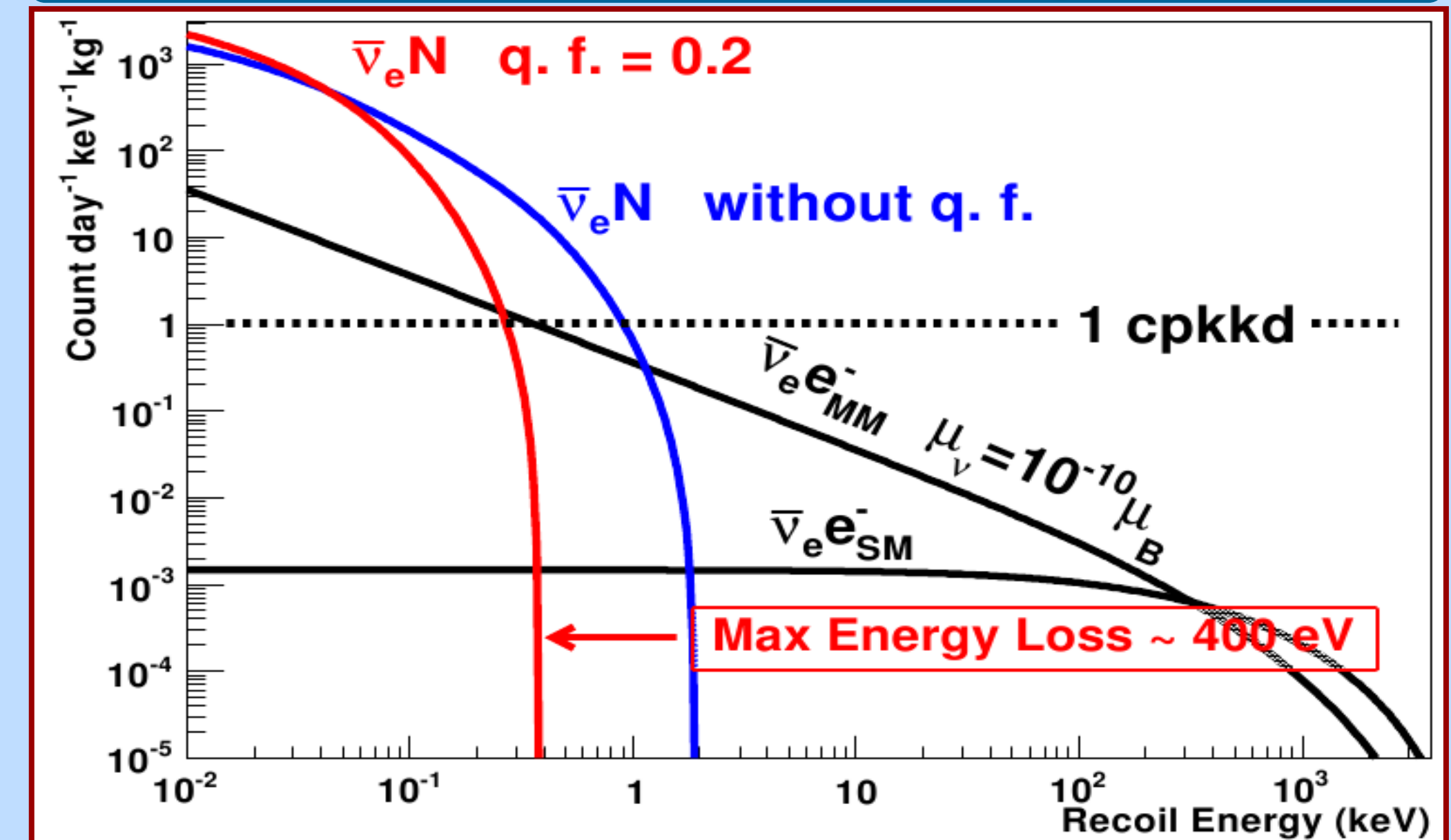
Dark Matter Searches



Standard conservative analysis \rightarrow WIMP rate < total events rate (No background subtraction)

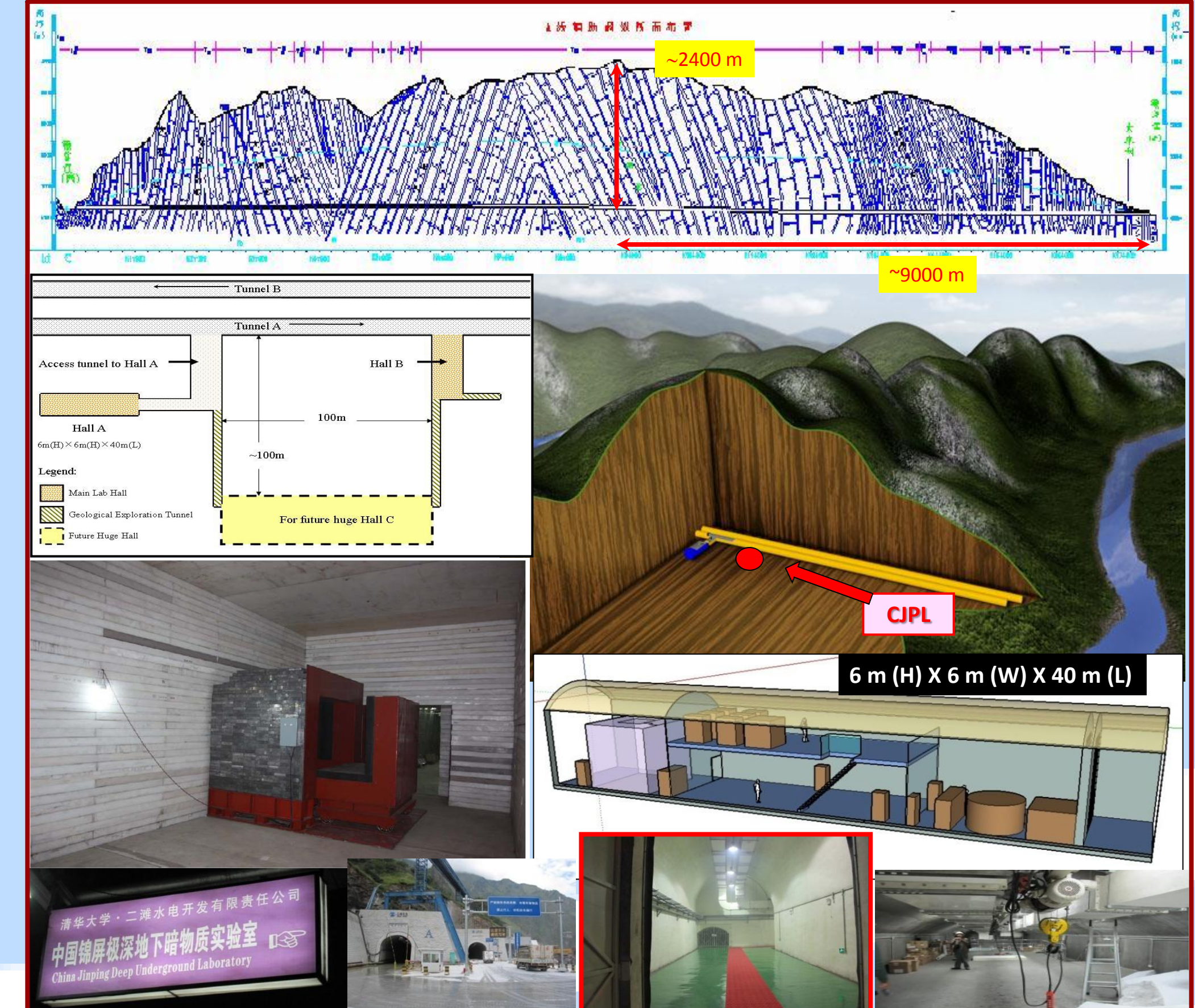
Adopt standard astrophysics parameters.

νN Coherent Scattering



Take Q. F. = 0.2, extrapolate 1 cpkld to eV level \Rightarrow signal/noise > 1 at 300 eV; At threshold = 100 eV $\Rightarrow 3.1$ count day⁻¹ kg⁻¹; 200 eV $\Rightarrow 0.23$ count day⁻¹ kg⁻¹; 300 eV $\Rightarrow 0.0084$ count day⁻¹ kg⁻¹

New Underground Lab (CJPL) @ ~7000 mwe



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