

XENON1T

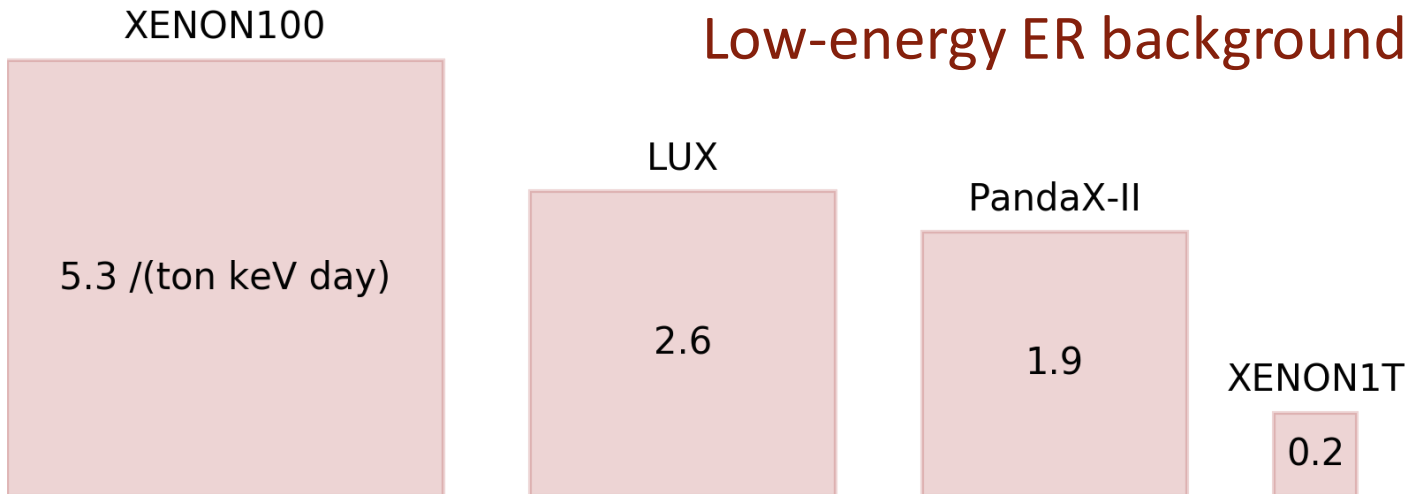
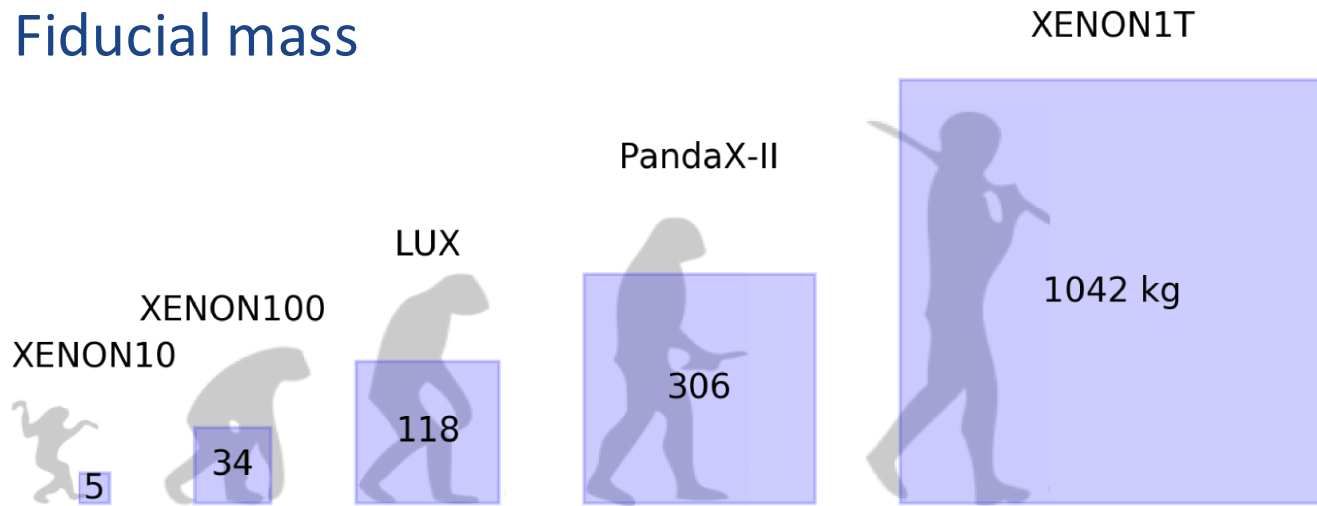
From First Data to First Results

Sander Breur, on behalf of the Nikhef Dark-Matter group

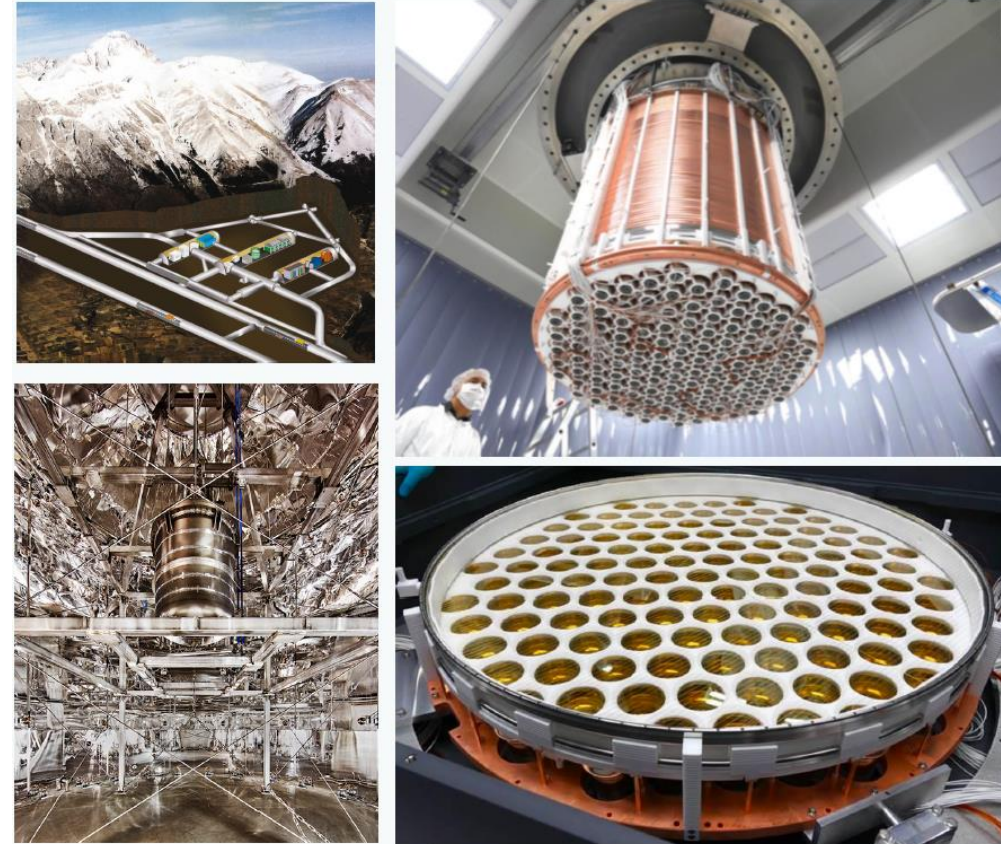


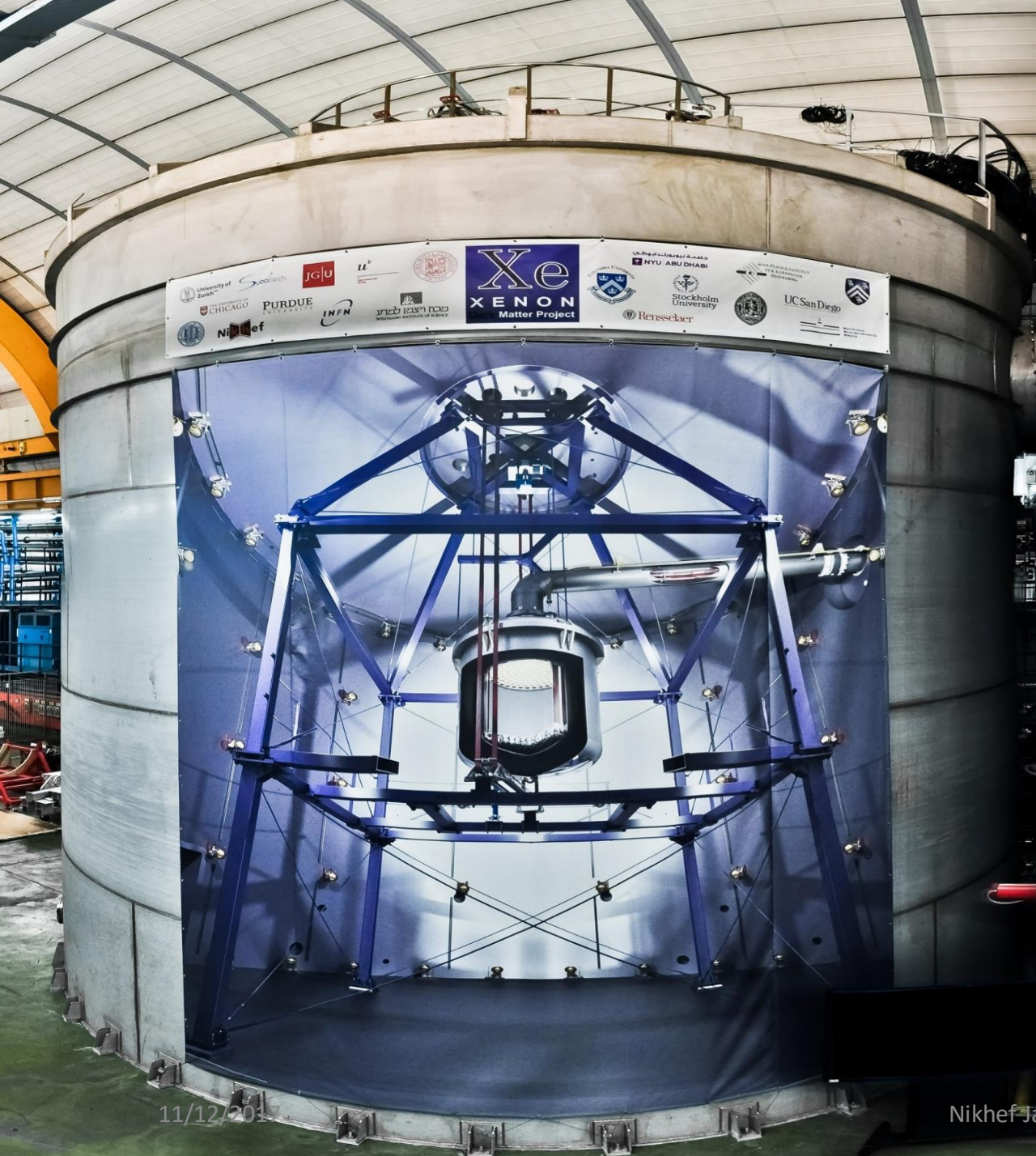
The XENON Evolution

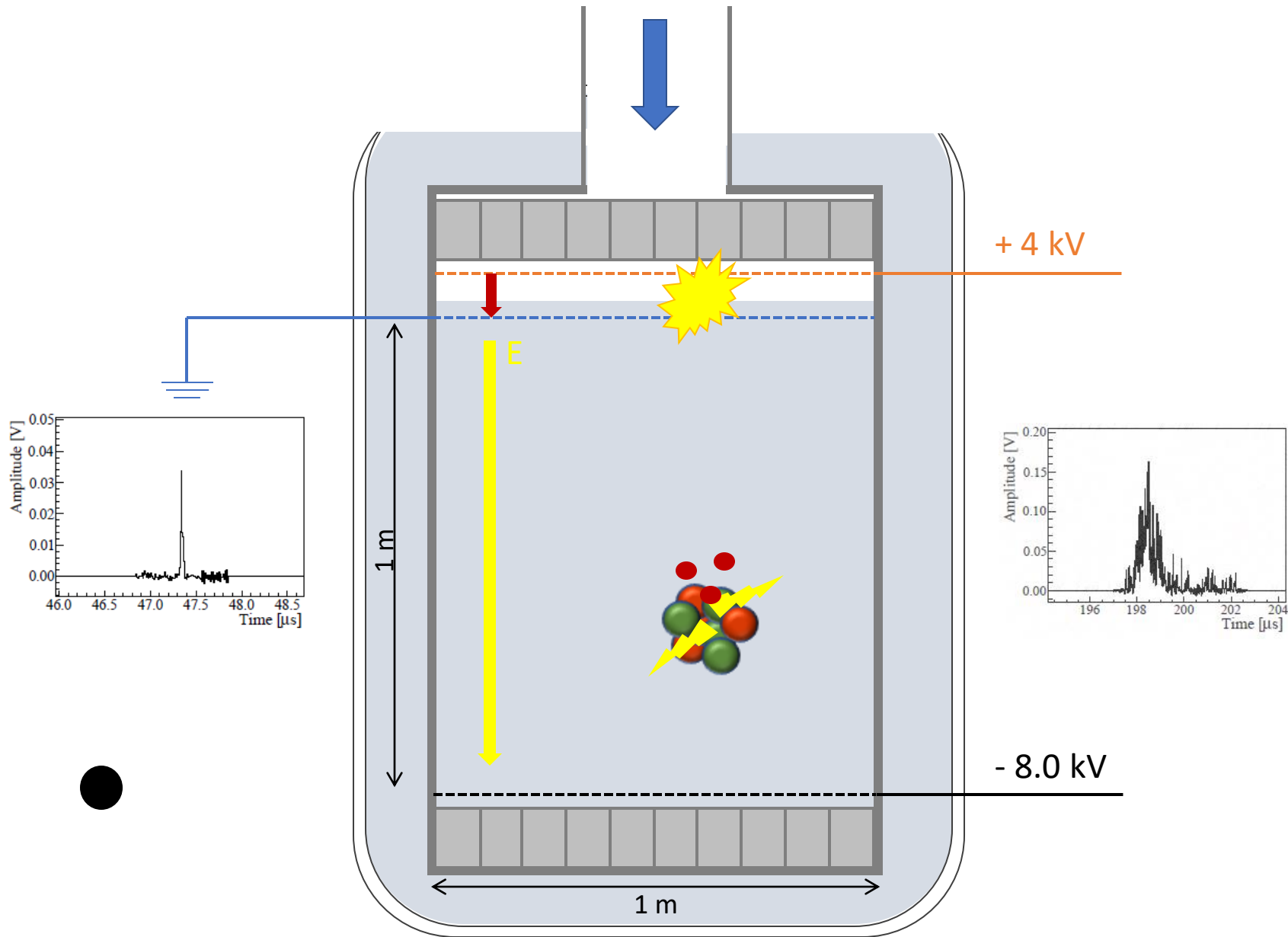
Fiducial mass



XENON1T

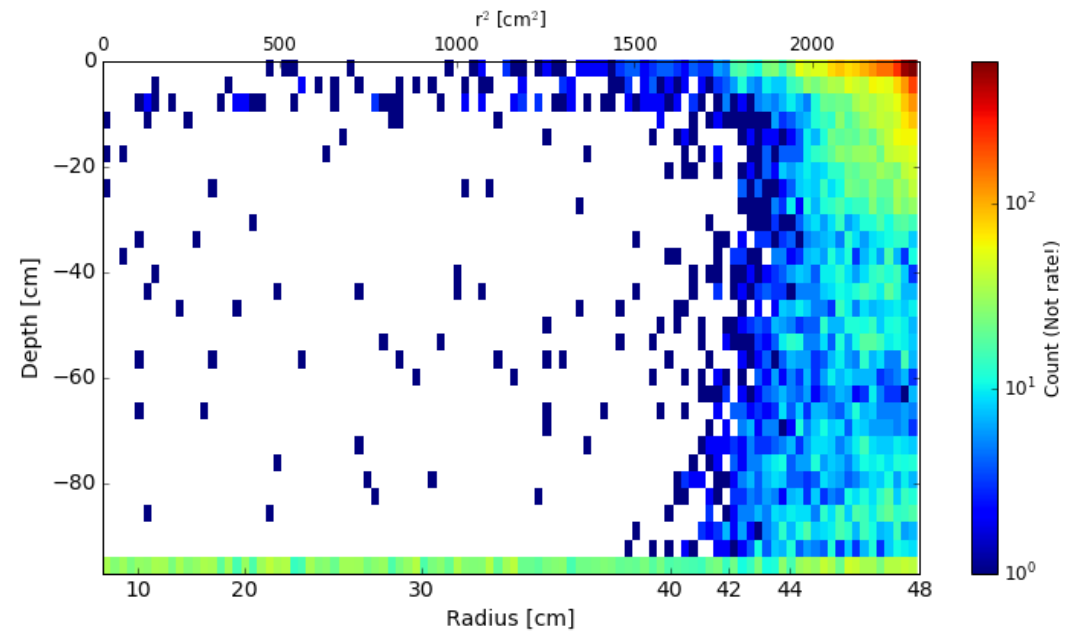




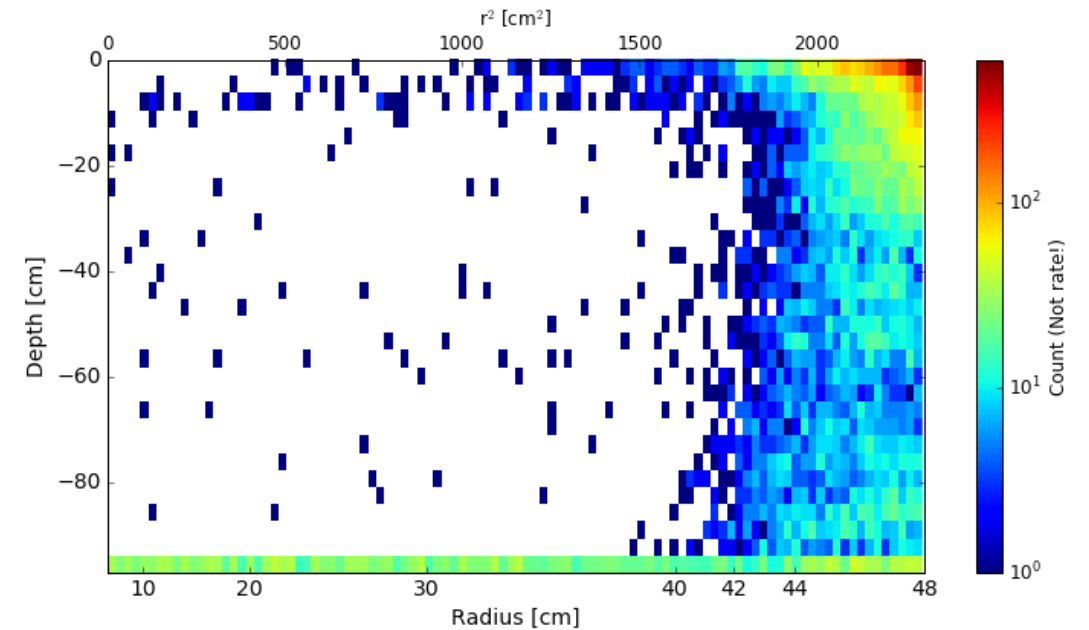
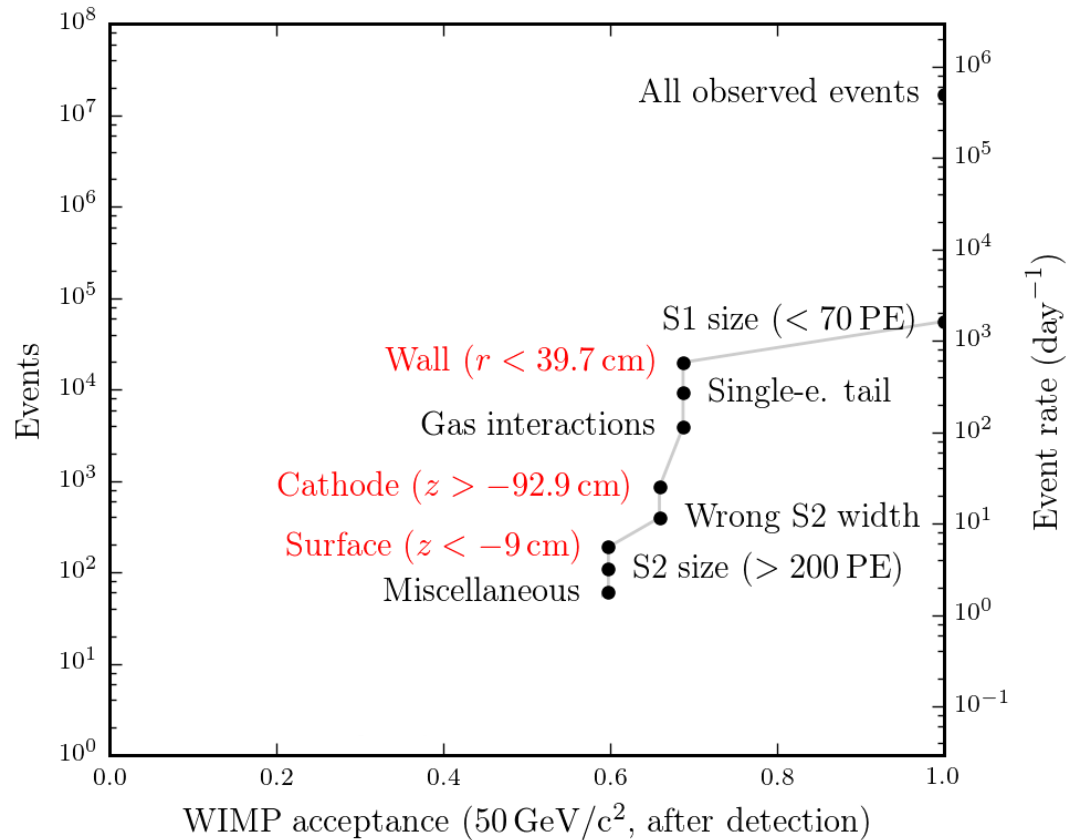


3200kg LXetotal
2000kg inside TPC

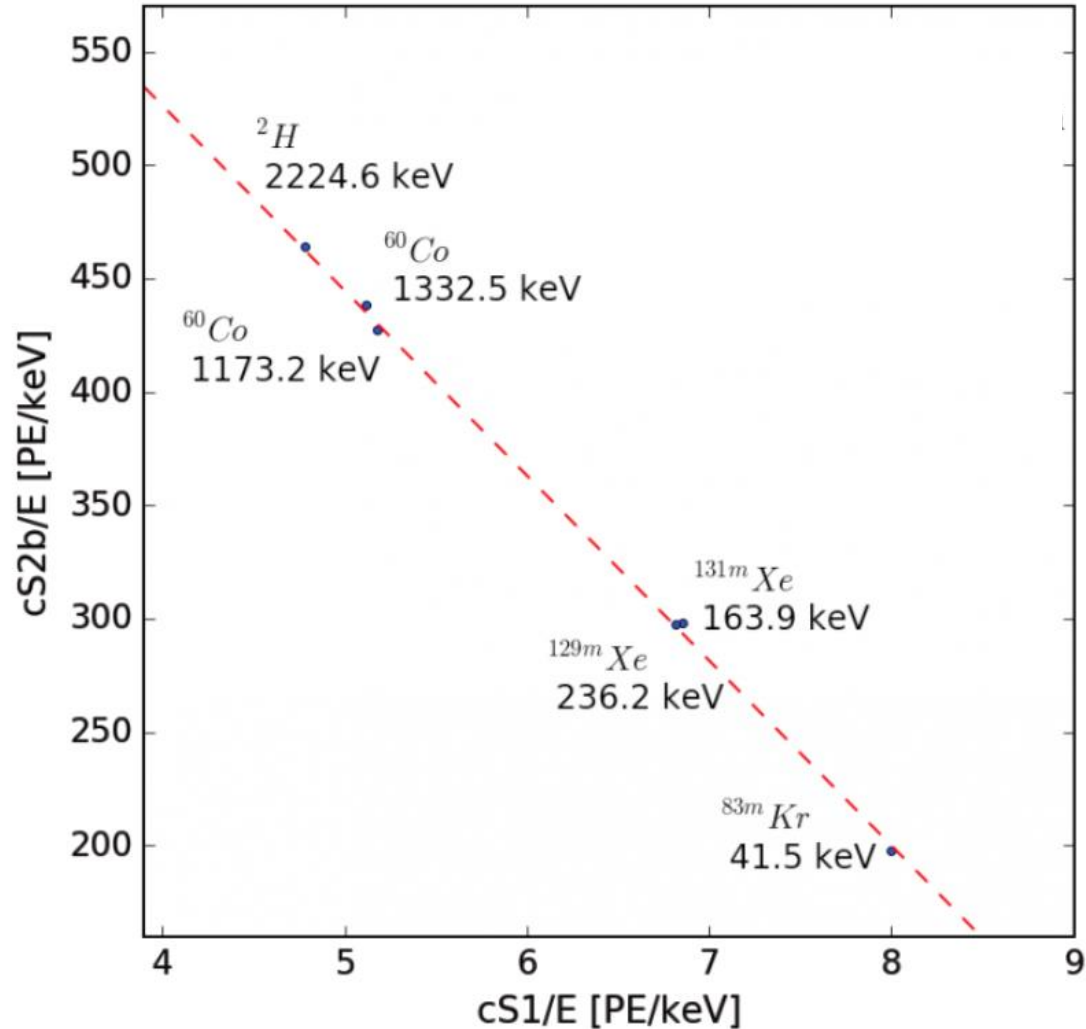
Cuts & Fiducial Volume



Cuts & Fiducial Volume



Energy Reconstruction



$$E_0 = W(n_\gamma + n_{e^-}) = W\left(\frac{cS1}{g1} + \frac{cS2}{g2}\right)$$

Photon gain: $g1 = 0.144 \pm 0.007$ (sys) PE/ph

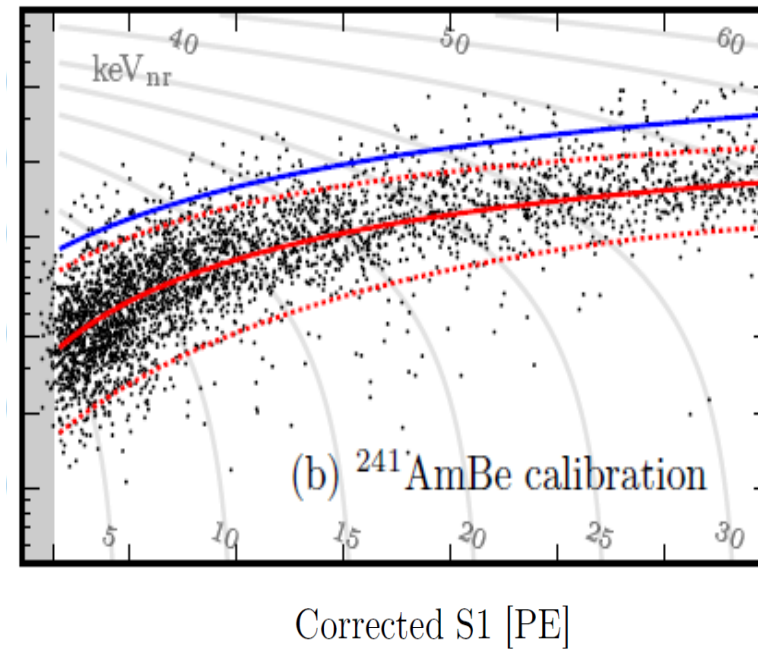
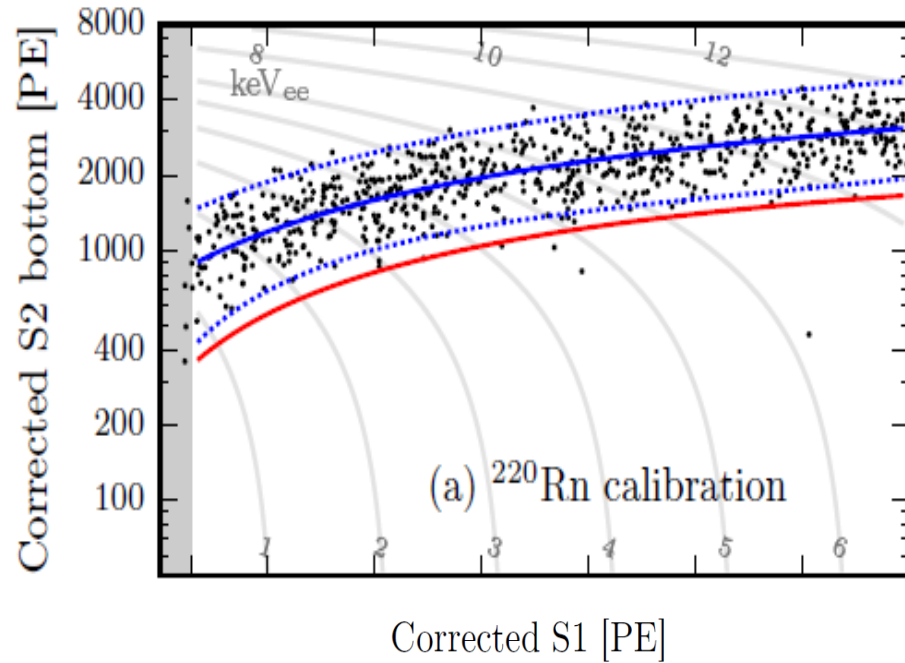
- Light detection efficiency (12.5 ± 0.6)%
- MC prediction 12.1%

Electron gain: $g2 = 32.9 \pm 0.8$ (sys) PE/e⁻

How to calibrate

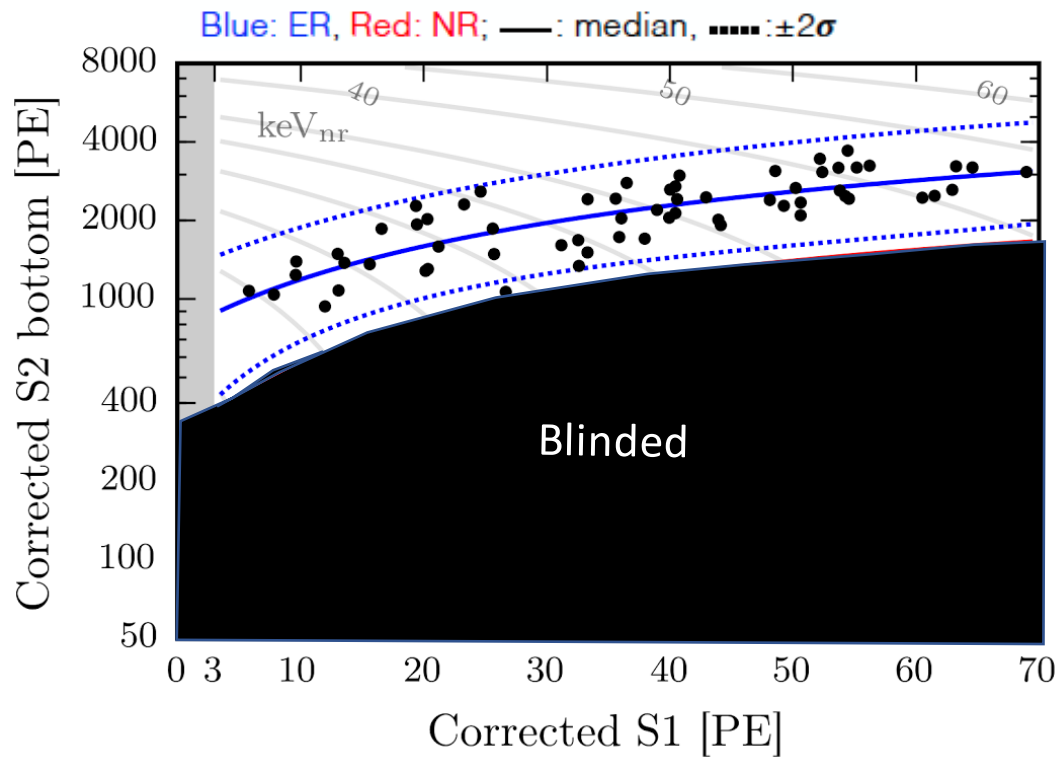


Discrimination



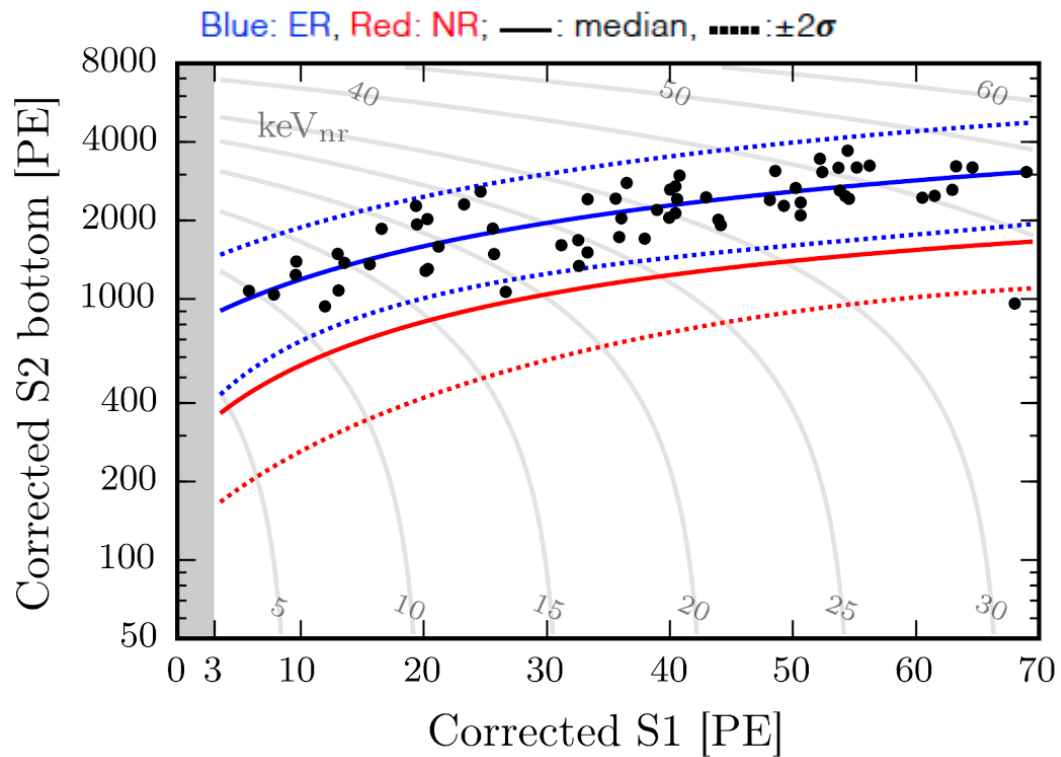
Blue: ER, Red: NR; —: median,: $\pm 2\sigma$

Unblinding...



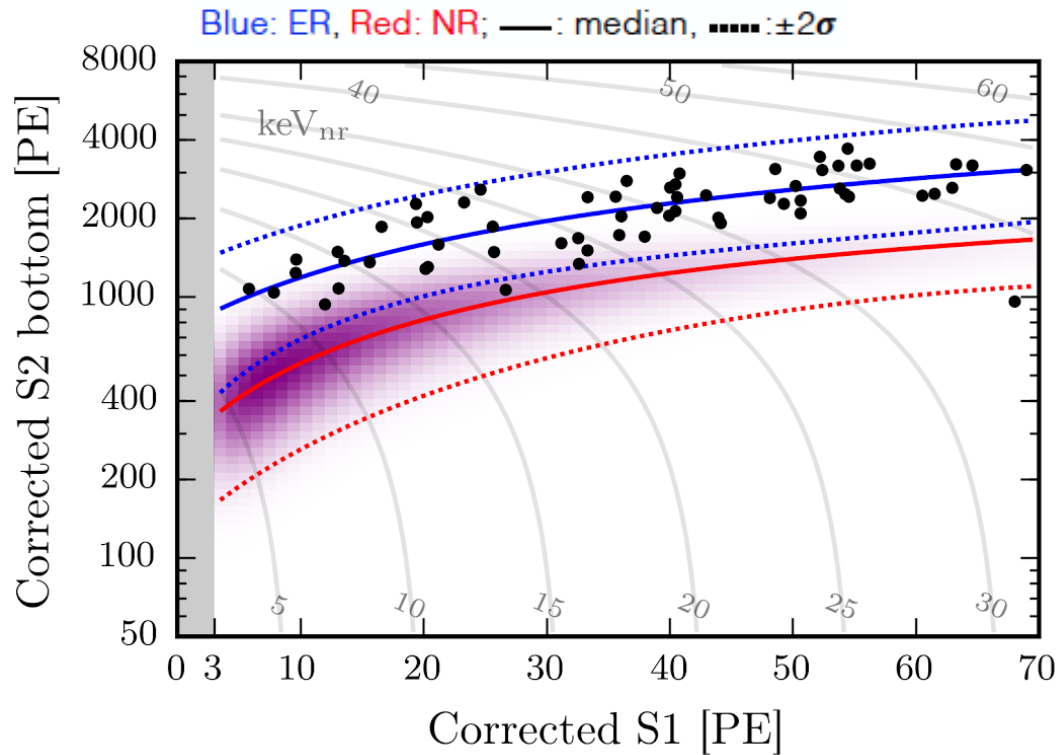
Background & Signal Rates	Full search region
Electronic recoils (ER)	62 ± 8
Radiogenic neutrons (n)	0.05 ± 0.01
CNNS (ν)	0.02
Accidental coincidences (ac)	0.022 ± 0.01
Wall leakage (wall)	0.52 ± 0.3
Anomalous (anom)	$0.09 (-0.06)(+0.12)$
Total background	63 ± 8
50 GeV/ c^2 , 10^{-46} cm ² WIMP (NR)	1.66 ± 0.01

Unblinding!



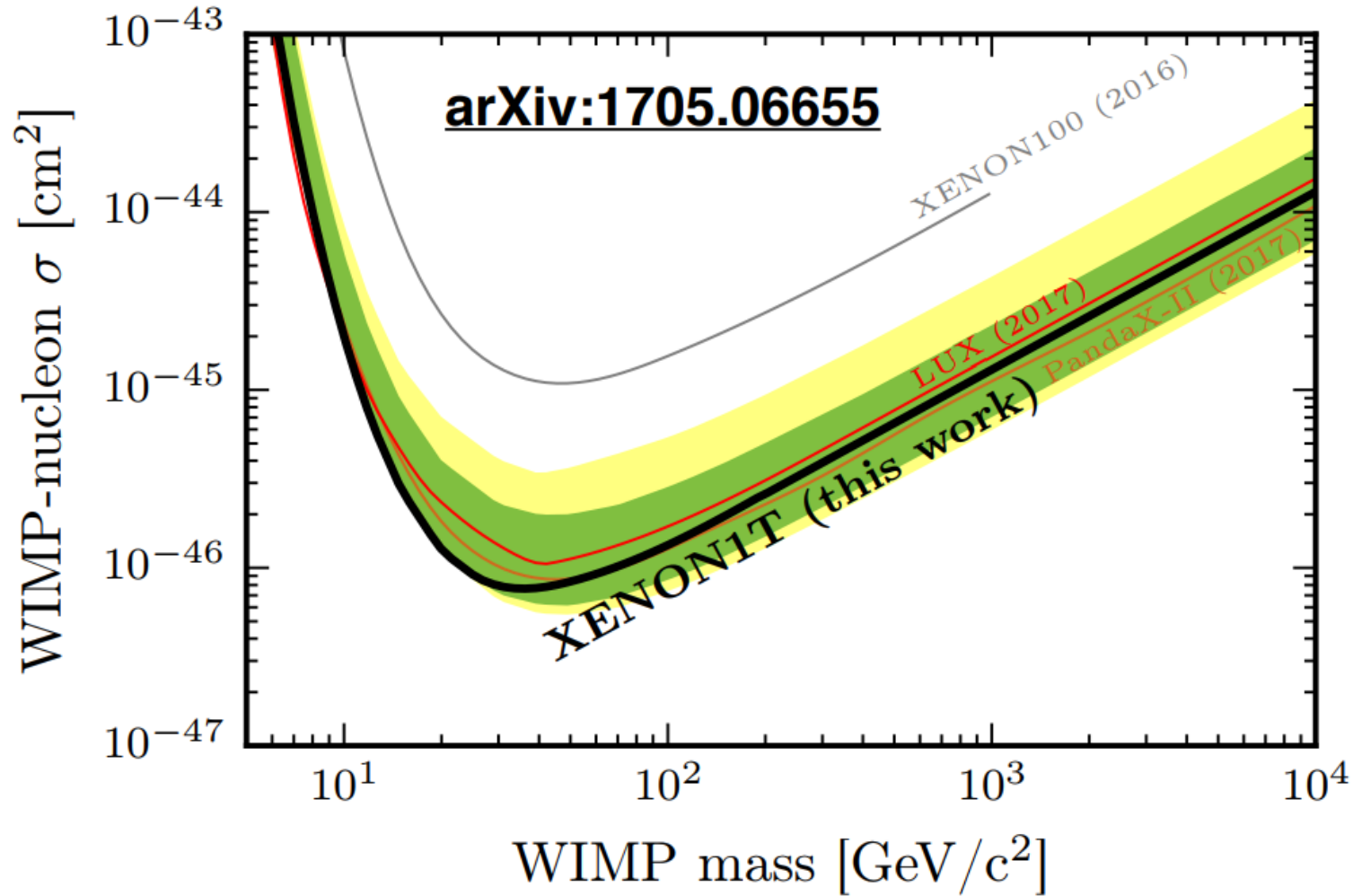
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The Limit



“World's Most Sensitive Dark Matter Detector Gives Its First Results” – NBC News

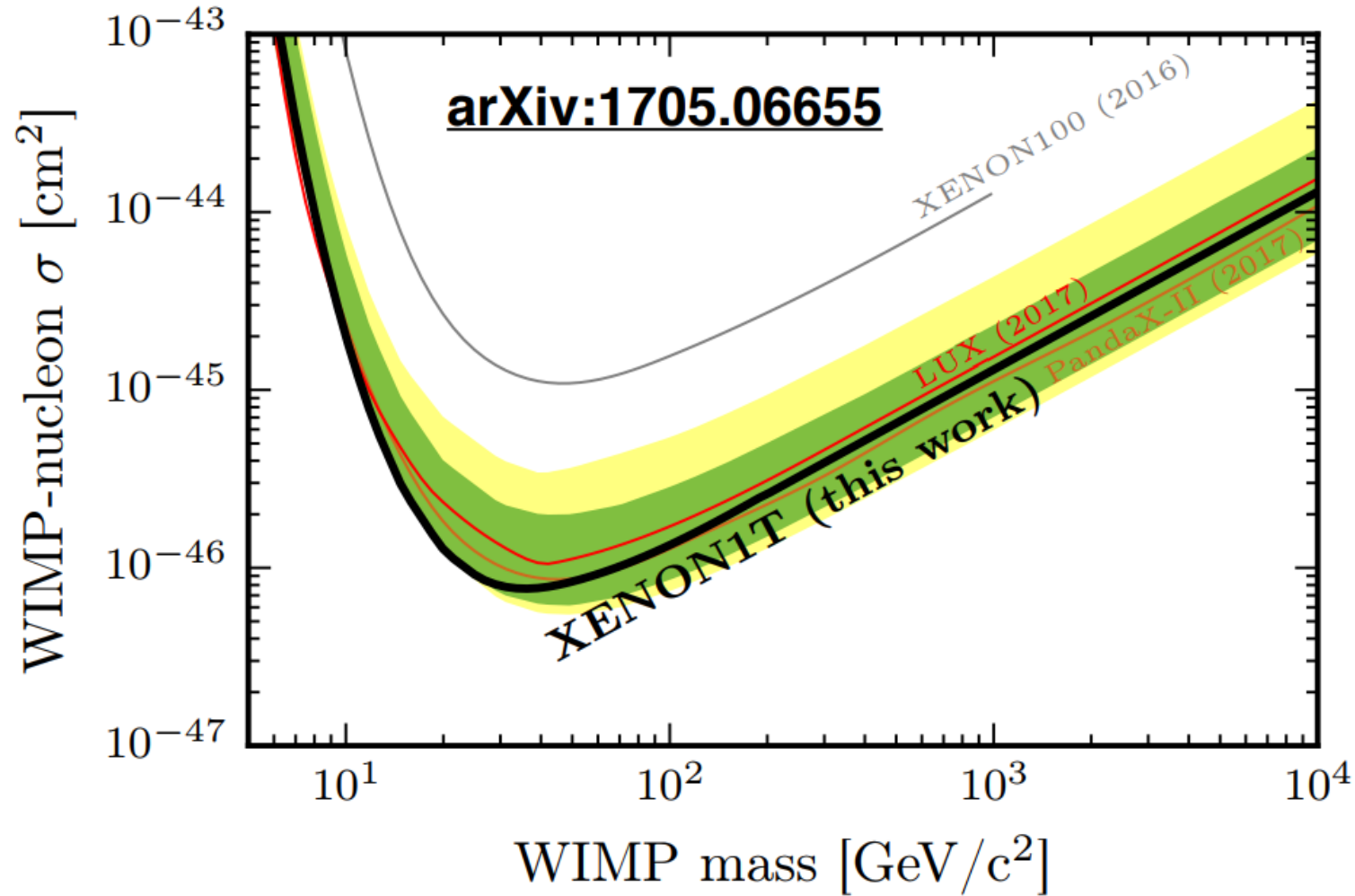
“Groot succes: 16 miljoen keer niks” - NRC

“Dark-Matter Hunt Fails to Find the Elusive Particles” - Scientific American



Phys. Rev. Lett. 119, 181301 (2017)

The Limit



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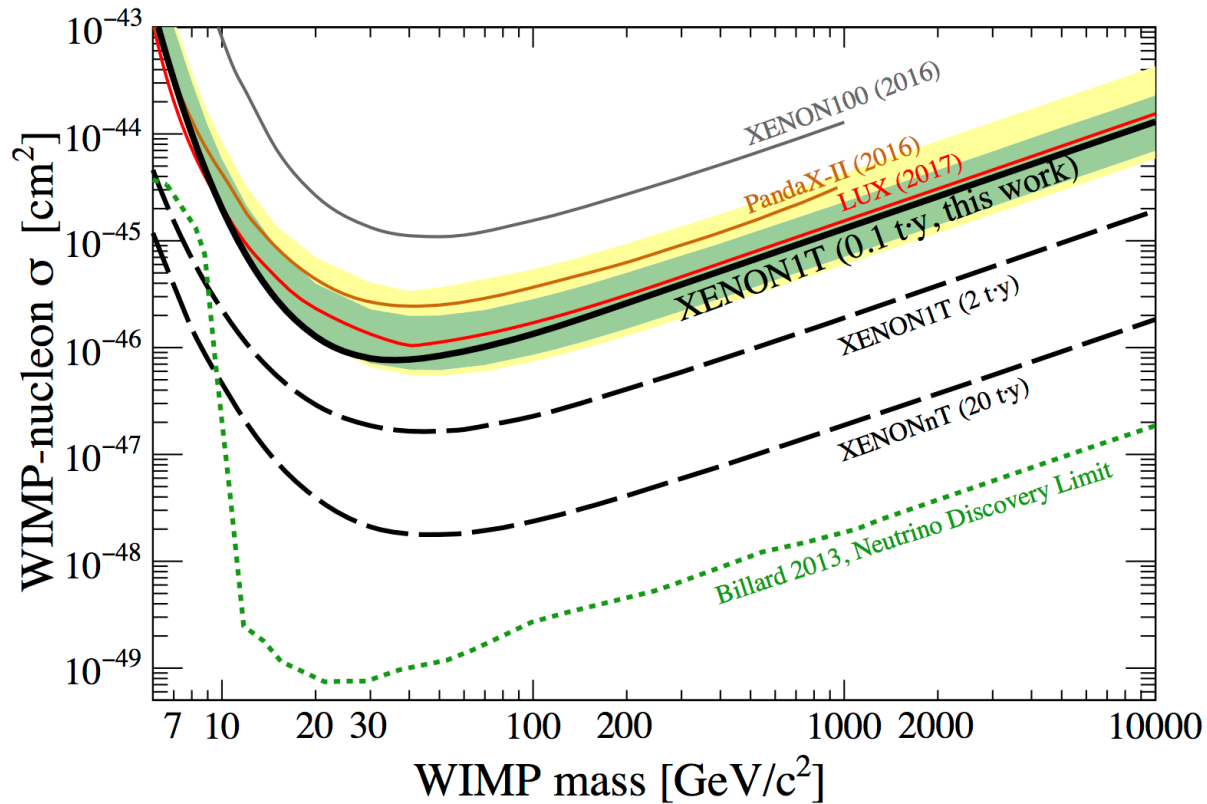
XENON1T:

- >200 live-days already taken (x6)
- SR1 analysis in final stage
- New results expected beginning 2018

XENONnT:

- 5 ton fiducial upgrade
- Commissioning starts in 2019

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