PandaX-II Dark Matter Research New Result

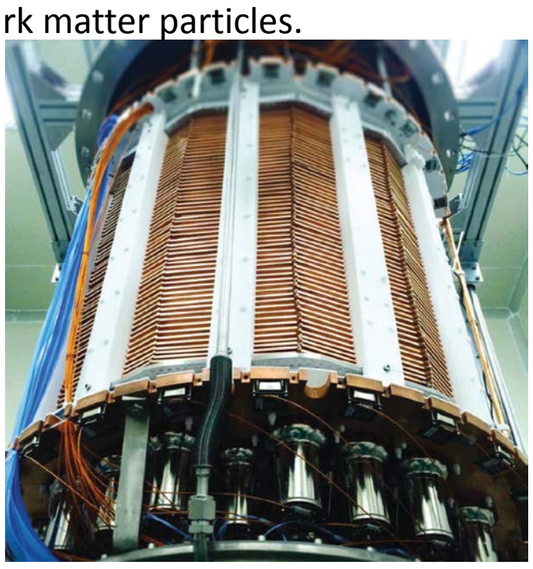
上海交通大学 SHANGHAI JIAO TONG UNIVERSITY

Cui Xiangyi, Shanghai Jiao Tong University
On behalf of the PandaX-III Collaboration

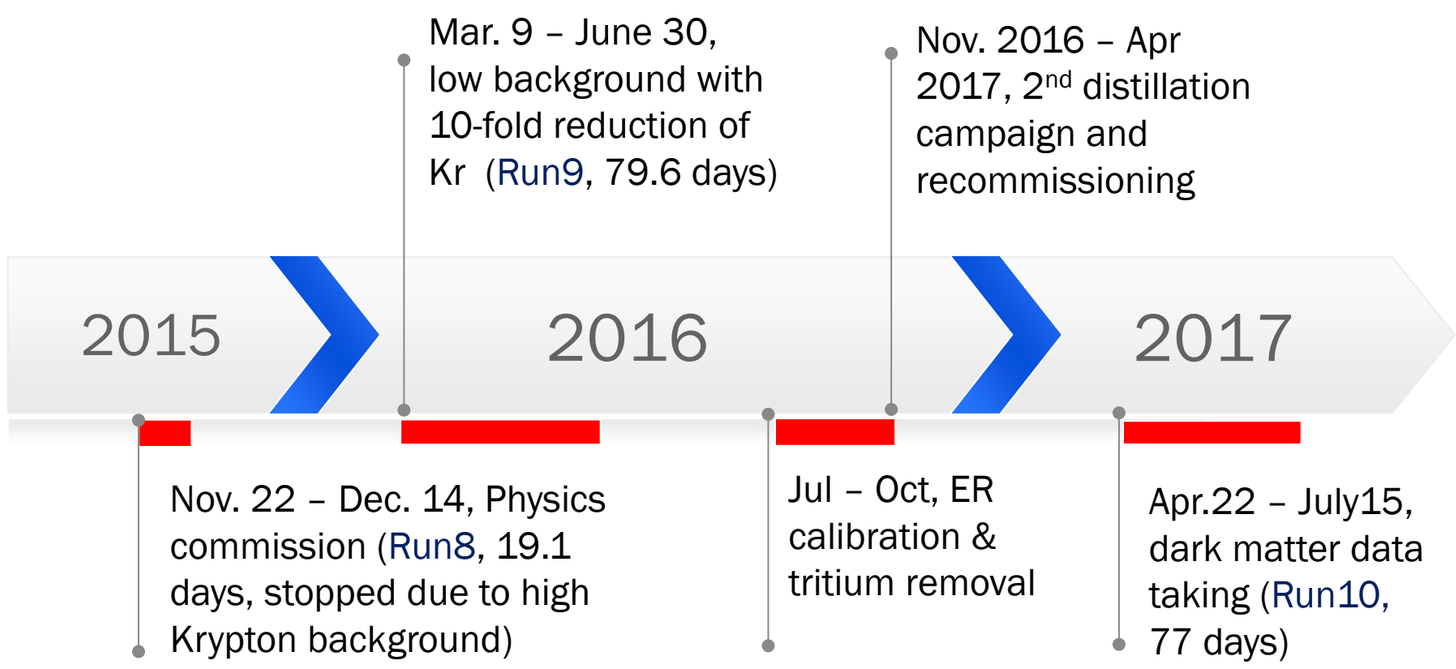
PANDA X PARTICLE AND ASTROPHYSICAL XENON TPC

PandaX-II

The PandaX-II experiment utilize dual-phase xenon time projection chamber (TPC) to carry out direct search for the dark matter particles.

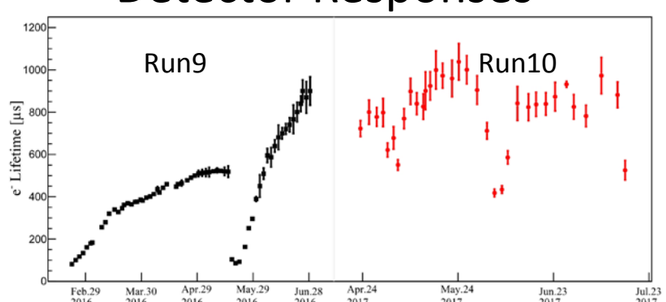


PandaX-II Run Histroy

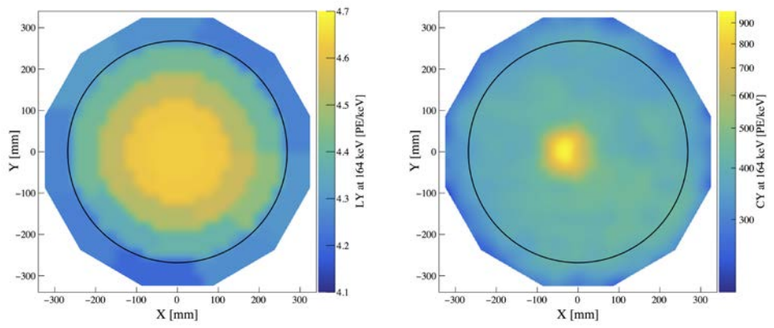


Data Analysis

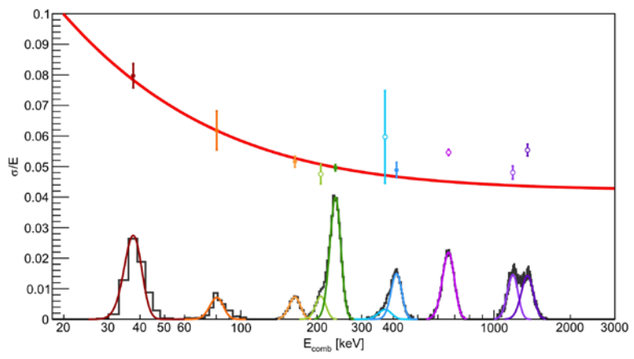
Detector Responses



- Electron lifetime on average 800 μs (1.4m drift distance) in Run10.

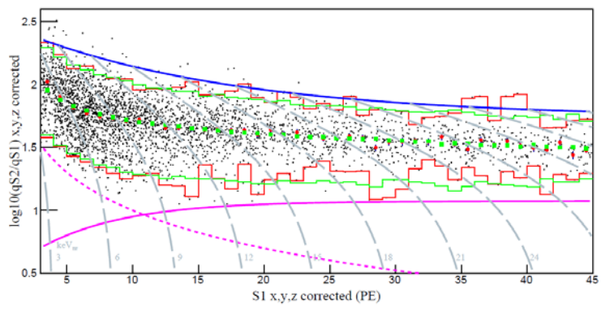


- Using gammas from xenon metastable states for S1/S2 uniformity correction.
- RMS for S2 18.2%; for S1 10.0%.

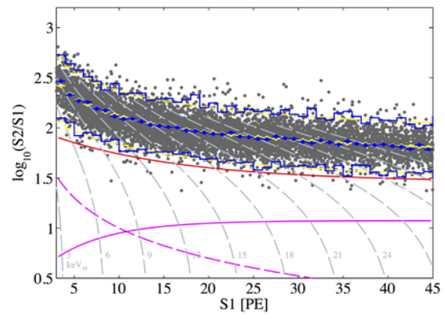


- Energy resolution vs. Ecomb.

ER&NR Calibration

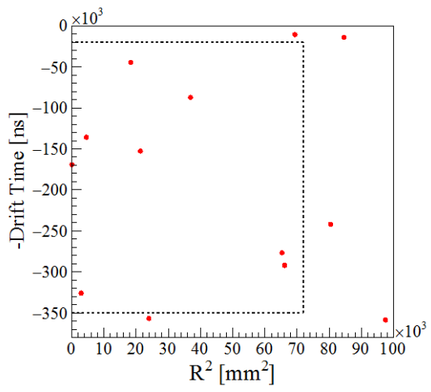


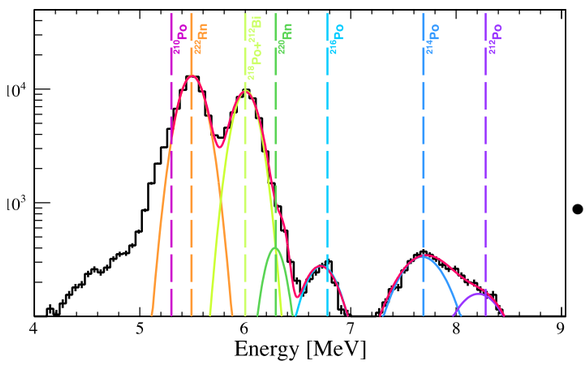
- NR calibration using AmBe source.
- ~3200 low energy single scatter NR events collected.
- NR median curve and NR detection efficiency determined.



- ER calibration using tritiated methane.
- ~8000 low energy ER events with electron lifetime ~700μs.
- Events leaked below the NR median: 0.53(8)%.

Background



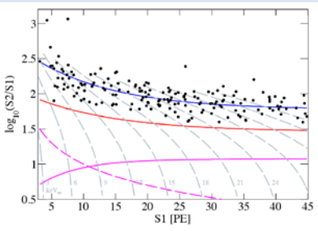


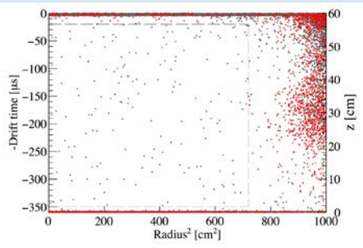
- Use (β,γ) delayed coincidence tag and 13 events found in target ⇒ 6.6(1.8) ppt of Kr in Xe.
- Coincidence tag and single alpha analysis search for the Rn background.

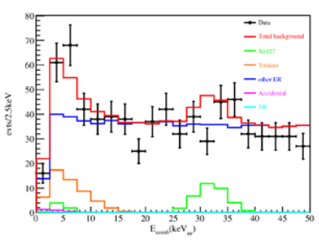
BK [mDRU]	Xe127	Tritium	Kr85	Rn222	Rn220	Detector ER	Solar Neutrino	Total
Run9	0.42	0	1.19	0.13	0.01	0.20	0.01	1.95
Run10	0.033	0.22	0.20	0.10	0.02	0.21	0.01	0.79

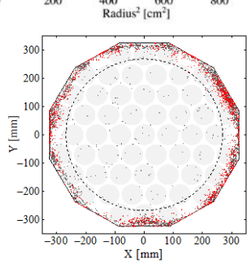
Dark Matter Search Result

- Total events: 177
  - Expected background below NR median: 2.05 evts with ~20% uncertainty.
  - Observed: 0.
- Data and expected background in good agreement.
- Residual events are uniformly distributed in the detector.









- With a total exposure of 5.4×10^4 kg day.
- With the lowest exclusion at 8.6×10^{-47} cm² at a WIMP mass of 40 GeV/c².