PandaX-II Krypton Background

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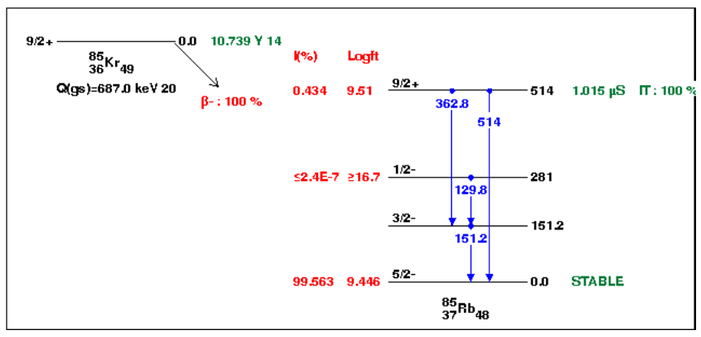
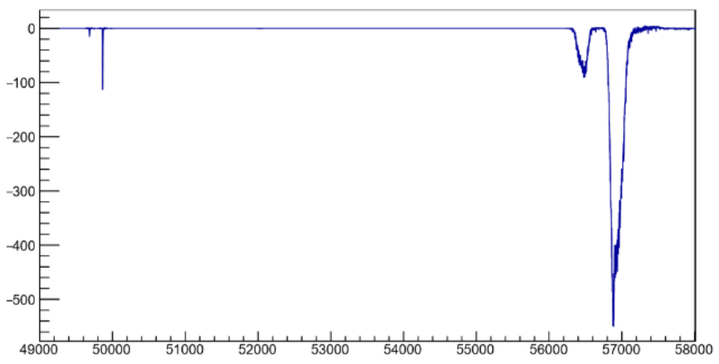
On behalf of the PandaX-III Collaboration

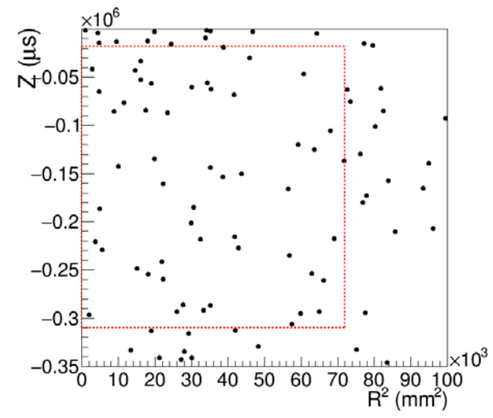
Krypton Background



- ^{85}Kr dominat βdecay with $T_{1/2}$=10.756y.
- ^{85}Kr/Kr ~ 10^{-11} in air.

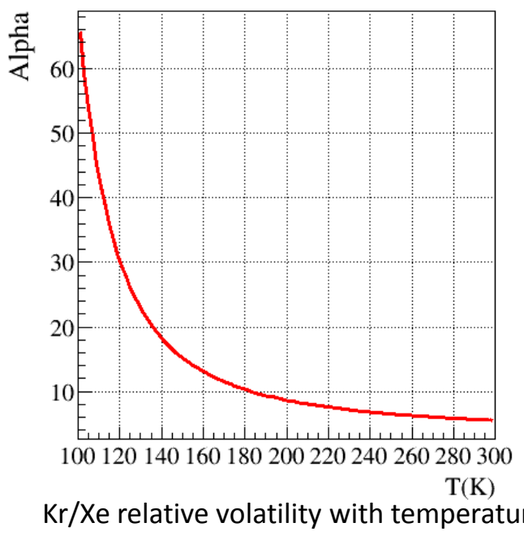


Typical ^{85}Kr event waveform in PandaX-II

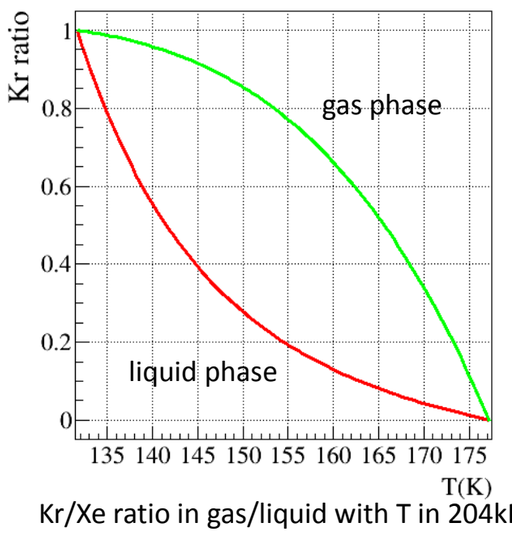


- Uniform distribution in liquid xenon [PandaX-II Run9].

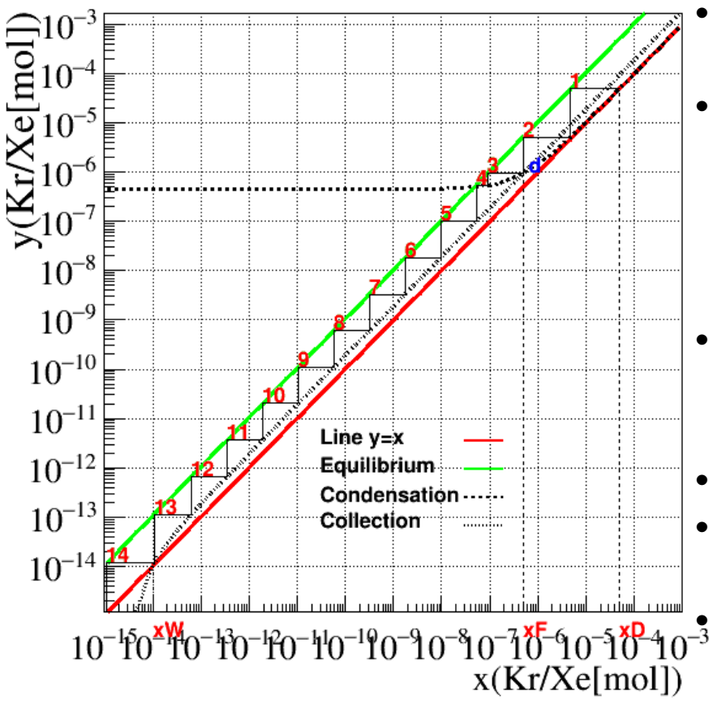
Krypton Distillation Tower



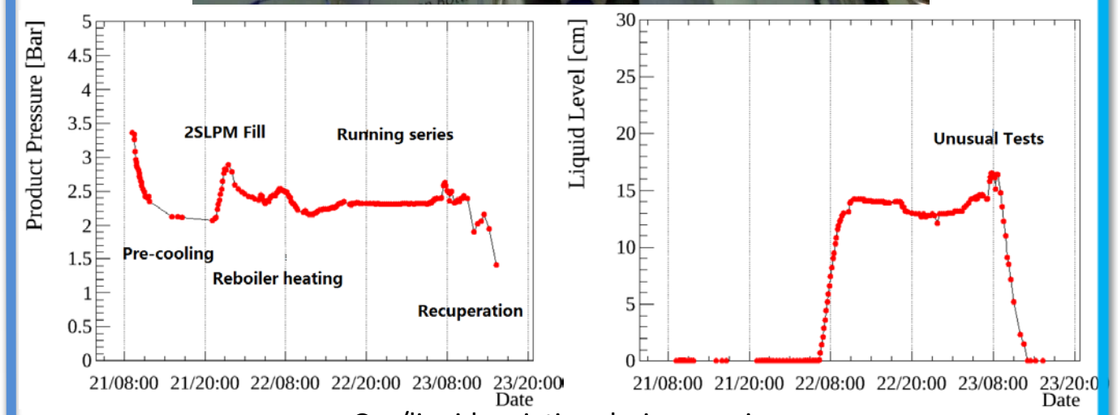
Kr/Xe relative volatility with temperature



Kr/Xe ratio in gas/liquid with T in 204kPa



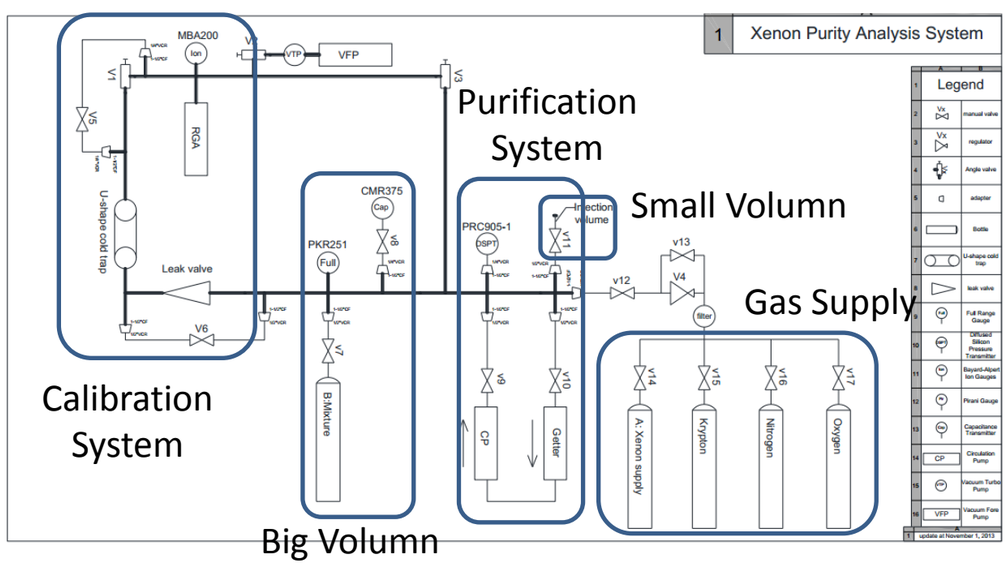
- Distillation method remove krypton.
- M-T method offer the tower height and Bain-Hougen relational offer the tower diameter.
- 5ppm Kr/Xe incoming and 0.1ppt Kr/Xe in product xenon.
- 1% offgas ratio.
- 6m packing height with 14 theoretical plate number.
- 125mm diameter with 0.41m^3/(m^2•h) sprinkle density.



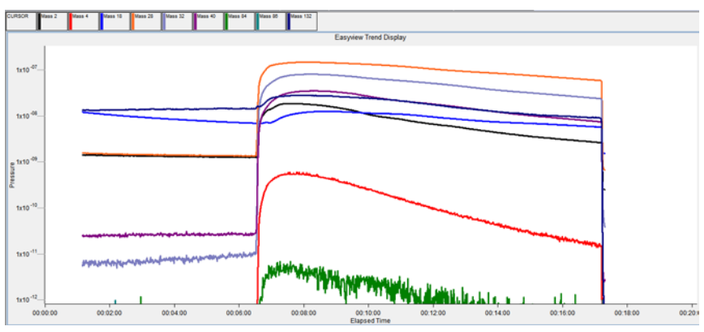
Gas/liquid variation during running

- Install the Phase-I tower from 2012 and first distillation in 2013.
- More than five times(~6 months) stable running.
- Move the tower to Jinping underground laboratory.

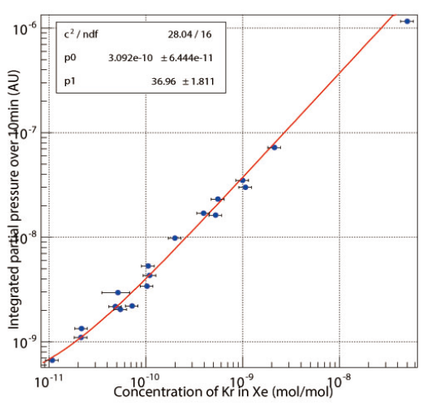
Krypton Measurement System



The flow diagram of the Kr measurement system based on RGA



Typical test spectrum



Calibration line

- Fill test Kr/Xe gas into the cold trap.
- LN2 cooling and start RGA with the micro-leakage valve.
- Record the spectrum and fit it to the calibration line.
- Two parallel system working in the China Jinping Underground laboratory.
- Increase measurement limit with more sensitive RGA.