

The status of Cryogenics for the PandaX-4T and future PandaX-30T

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PandaX-4T is a xenon dual-phase detector with about six tons of liquid xenon as target for dark matter search, it runs for 2 years. The next generation is the PandaX-30T with about 50 tons of xenon. In this report, the performance of PandaX-4T cryogenics for the commission run (RUN1) and RUN2 are reported. Two coldheads (total: 3 coldheads) are enough, the static heat load is around 90W, outer vacuum is less than 2.4×10^{-4} Pa; the fluctuation of xenon pressure is less than 0.5%; the precision of xenon temperature is less than 0.1K. The average speed of online purifying xenon is around 100slpm (mainly LOOP1), maximum electron lifetime is around 2200 us (RUN2). Total radon level of PandaX-4T is less than that of XENON1T, however, the contribution of LOOPS is almost half. At last, the cryogenics design of PandaX-30T is introduced too.

Summary

The cryogenics for PandaX-4T experiment runs for more than 2 years, it works well. The flow rate of LOOP1 is ~ 100 slpm for online purifying xenon, LOOP2 is mainly used for gas calibration and online distillation. The maximum e^- lifetime is around 2200us. However, the radon contribution from KNF circulation pump is almost half of total radon background. It has to be improved in the future.

The cryogenics of PandaX-30T is on the way, its prototype will be tested in the next two years.

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