

# Cooling test of Transfer Cryostat for the development of polarized HD target

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We are developing a polarized HD target for future LEPS experiments at SPring-8 [1]. We can perform the measurement of almost all polarization observables for hadron photoproduction by using both the polarized photon beams and the polarized HD target. In 2008, we succeeded in producing a polarized HD target for the first time [2, 3]. The relaxation time of the polarized hydrogen was 100 days when the HD target was cooled at  $T=300$  mK at  $B=1$  Tesla. The relaxation time of 100 days is acceptable for the LEPS experiment. The next job is to construct a system for safely transferring the HD target from RCNP to SPring-8. Although the ORSAY group in France provided us with two tall cryostats in 2006, we have not operated the cryostats yet. One cryostat, called 'Transfer Cryostat 1'(TC1), is used to extract the target from the dilution refrigerator (DRS) and install it to the storage cryostat (SC) at RCNP.

We carried out a cooling test of the TC1 [4]. Two silicon diode thermo sensors were used to check the temperatures of the dummy target and the bottom of the target layer as shown in Fig. 1. After filling liquid helium to the magnet layer and the target layer, the dummy target which is attached to the bottom of the target layer, was cooled to 4.7 K as shown in Fig. 2. The lowest temperature of 2.6 K was achieved for the dummy target by reducing the pressure of the liquid helium bath in the target layer. Since the relaxation time for the hydrogen in the polarized HD target is longer than 140 hours in this condition, the polarization loss is found to be smaller than 1% during moving the target in  $\sim 1$  hour [4].

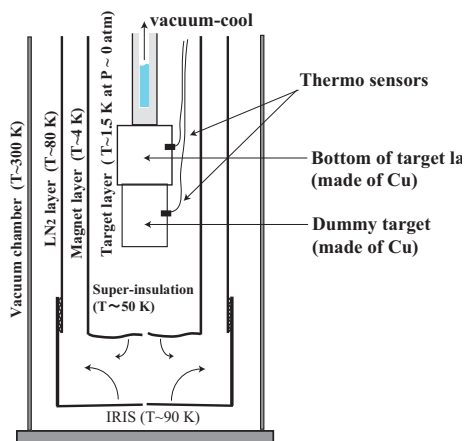


Figure 1: Schematic drawing of the bottom part of the TC1. Two thermo sensors were installed on the dummy target and the bottom of the target layer.

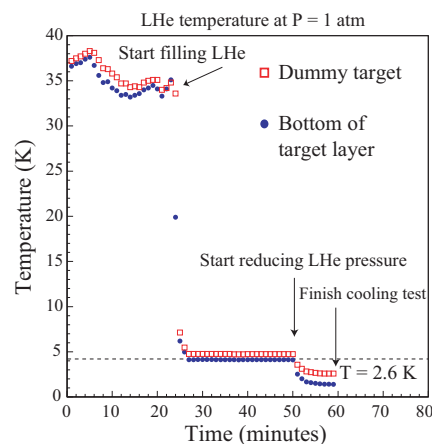


Figure 2: Temperatures of the dummy target and the bottom of the target layer during the cooling.

There is no space for the other transfer cryostat in the BL33LEP experiment hutch at SPring-8 recently. We started producing a new transfer cryostat called 'Transfer Cryostat 2' which can be operated in a small space. We will finish the production as soon as possible and try to use the polarized HD target in the LEPS experiment in 2010.

## References

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