Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Construction for Cryogen free 3He/4He dilution refrigerator integrated with conduction cooled 15T magnet JUNGHYUN SHIN, SUN-GYU PARK, EUNSEONG KIM, Center for Supersolid and Quantum matter Research and Department of physics, KAIST — We constructed a cryogen-free 3He/4He dilution refrigerator (DR) integrated with a conduction cooled 15T superconducting magnet. The integrated magnet and 3He/4He dilution system is precooled by a commercial two stage pulse tube refrigerator (PTR). 3He/4He mixture gas compressed at 4 Bar is first introduced into the heat exchangers mounted on the first (40K) and the second (2.5K) stage of PTR. The mixture is condensed at the second stage without Joule-Thomson stage due to its high pressure. Once the liquid 3He/4He mixture is obtained, a conventional DR design including a still, counterflow heat exchangers, and a mixing chamber is adopted for the continuous operation. The 15T superconducting magnet is directly connected to the second stage and cooled by conduction cooling down to about 3K after being pre-cooled with liquid N2 flow. The current leads for superconducting magnet up to 120A require careful considerations of low thermal-conductance with high electrical-conductance and robust electrical isolation.

Junghyun Shin
KAIST

Date submitted: 14 Nov 2014 Electronic form version 1.4