Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

**Pomeranchuk cell for hyperpolarized $^3$He based on the brute force method** SEIJI MAKINO, Wakayama Medical University, MASAYOSHI TANAKA, KUNIHIRO UEDA, Kobe Tokiwa University, MAMORU FUJIWARA, Research Center for Nuclear Physics, Osaka University, HISAKO FUJIMURA, Wakayama Medical University, MASARU YOSOI, TAKESHI OHTA, Research Center for Nuclear Physics, Osaka University, GIORGIO FROSSATI, ARLETTE DE WAARD, Leiden Cryogenics, GERARD ROUILLE, IR4M, Universite Paris-Sud XI
— MRI (Magnetic Resonance Imaging) has been used for the medical diagnosis as a radiation-free imaging equipment. Since the proton has been mainly used for medical MRI, usefulness has been rather restrictive. As an example for expanding the range of applicability, MRI with hyperpolarized $^3$He gas has been used for the lung disease. Here, "hyperpolarized" means "polarized higher than the thermal equilibrium polarization." For producing a large amount of hyperpolarized $^3$He gas at a time, we have been developing a hyperpolarization technique based on the brute force method which uses an ultralow temperature of a few mK and a strong magnetic field around 17 T in combination with the principle of the Pomeranchuk cooling. The Pomeranchuk cell made with non-metallic materials of small heat capacity is attached to the $^3$He/$^4$He dilution refrigerator using a sintered silver allowing large heat conduction. After the sensors to monitor the temperature and pressure of $^3$He are calibrated and the Pomeranchuk cell is constructed, the system is tested. Then, the solidification of $^3$He and the measurement of NMR (Nuclear Magnetic Resonance) signals of $^3$He under the magnetic field of 17 T are carried out. The current status is reported in this talk.

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Date submitted: 01 Jul 2014 Electronic form version 1.4