Contribution ID: **1008** Contribution code: **THU-PO3-802-03** Type: **Poster**

Conceptual design of a magnetic refrigerator for cooling quantum computers

Thursday 18 November 2021 10:00 (20 minutes)

NIMS has started design of a magnetic refrigerator to cool quantum computers. As well known, quantum computer is bringing a revolution to the world of super computers. In general, 3He-4He dilution refrigerators are used to cool the quantum computers at operating temperature below 100mK. However, dilution refrigerator uses a lot of helium 3, that is very expensive these days. On the other hand, magnetic refrigerator is also able to reach temperatures below 100 mK. One of the biggest advantages of the magnetic refrigerator is to use much less helium 3, which might contribute whole refrigerator price. This study will report progress on specially designed NbTi solenoid magnet and conceptual design of the magnetic refrigerator for application of quantum computers.

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Session Classification: THU-PO3-802 Cryostats and Cooling systems