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Properties of two stage Adiabatic Demagnetization Refrigerator

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In recent years, many space missions using cryogenic temperatures are being planned. In particular, a high resolution sensor like Transition Edge Sensor needs very low temperatures below 100 mK. It is well known that Adiabatic Demagnetization Refrigerator (ADR) is one of most useful methods to produce ultra-low temperatures in space because of independence on the gravity.

We have studied a continuous ADR system consisting of 4 stages and it demonstrated to provide continuous temperatures around 100 mK. But there were some amounts of heat leaks from power leads which resulted to reduce the cooling power.

In this study, several efforts to upgrade our ADR system will be presented. First, we will show the effect of using the HTS power leads. Then, a cascaded Carnot cycle consisting of 2 ADR units will be discussed.

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