
NIRSPEC

UCLA Astrophysics Program

U.C. Berkeley

W.M.Keck Observatory

George Brims

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NIRSPEC Cryomechanics Design Note 15.00 LN₂ reservoir

Introduction

The liquid nitrogen vessel will provide most of the pre-cooling for the system, allowing for a quicker turnaround in the event the instrument has to be warmed up and cooled down again. It will also provide a buffer against the temperature rising during power outages or CCR problems. The overall thermal design is in NCDN17.

What next?

Thermal calculations have to be completed in order to quantify the required capacity. Hold time in the absence of CCR power is obviously an important parameter, as is cooldown time. Once we know how big a reservoir we need, we have to figure out how it should be constructed. We have the option of making it ourselves as we did with the test chamber, or going to an outside vendor such as IR Labs. We should definitely explore the cost implications of each path by sending out an RFQ to several vendors. As well as cost we have to weigh up the reliability of each method and the time required to iterate on a fix if we do it ourselves.

One other factor we must take into account is the efficiency of the different types of container in actually cooling the instrument. The Gemini reservoir for instance has been solid and leak-free, but doesn't have a truly flat face to interface to the rest of the instrument and give a good cooling path.