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C4Or1A-05: Design Study of Suspension Systems for Continuous Adiabatic Demagnetization Refrigerators

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Upcoming probe missions, such as the Probe far-Infrared Mission for Astrophysics (PRIMA), are requiring Continuous Adiabatic Demagnetization Refrigerator (CADR) with larger temperature spans within their stage's architecture. These temperature spans will require novel designs to those that have flown in the past. In this design study, we will be developing spaceflight suspension systems that are simpler, more compact, and/or span larger temperature gradients. We will be looking into the use of plastics such as Vespel, metals such as Ti 15-3-3-3, Kevlar designs, passive launch locks, and heat intercepts in the attempt to span temperatures between 30 mK to 4.5 K, like those seen between the salt pill and magnet of some of our coldest CADR stages. This paper will describe the challenges of the design concepts studied and their pros and cons.

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