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ULTRA-FLEXIBLE THERMAL BUS FOR USE IN THE ASTRO-H ADIABATIC DEMAGNETIZATION REFRIGERATOR

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The adiabatic demagnetization refrigerator (ADR) developed for the Astro-H Soft-Xray Spectrometer (SXS) is a multi-stage solid-state cooler. It is capable of holding the SXS detector array at 0.050 K for greater than 24 hours with a recycle time of less than one hour. This quick recycle time relies upon high-conductivity thermal straps to couple the individual stages to a pair of heat switches without imposing a lateral load on the paramagnetic salt pills. To accomplish this we construct thermal straps using a technique of diffusion bonding together the ends of high-purity copper straps leaving the length between as individual foils. A thermal bus created this way has a thermal conductivity comparable to a solid strap of the equivalent thickness but with much-increased flexibility. The technique for selecting the base material, machining, cleaning, forming into final shape, and finally bonding together individual foils will be discussed along with examples of complete straps in various geometries.

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