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C3Or4A-03: Finding a low temperature leak

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The astrophysics Xray Imaging and Spectroscopy Mission (XRISM) contains two instruments. The spectrometer, Resolve, uses x-ray microcalorimeters operating at 50 mK to obtain photon-limited spectroscopy in the 0.5 to 10 keV range. As a precooler to the Adiabatic Demagnetization Refrigerator that reaches 50 mK, a 40 liter superfluid helium dewar and a 4.5 K Joule-Thomson cooler are used. Early in the ground test program the helium dewar developed a low temperature leak. Despite having a getter within the dewar, the leak would have prevented a successful mission. This paper describes the leak that was found, its repair, and the leak measurements that were performed on the 10 cool downs after repair before launch. We will also list lessons learned from the experience.

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