



## Custom-built research refrigerators for ultra-low temperature

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1. Cryogen-free  $^3\text{He}$  refrigerator
2. Cryogen-free two stage adiabatic demagnetization refrigerator
3.  $^3\text{He}$ -  $^4\text{He}$  dilution refrigerator
4. Miniature paramagnetic low-temperature thermometers

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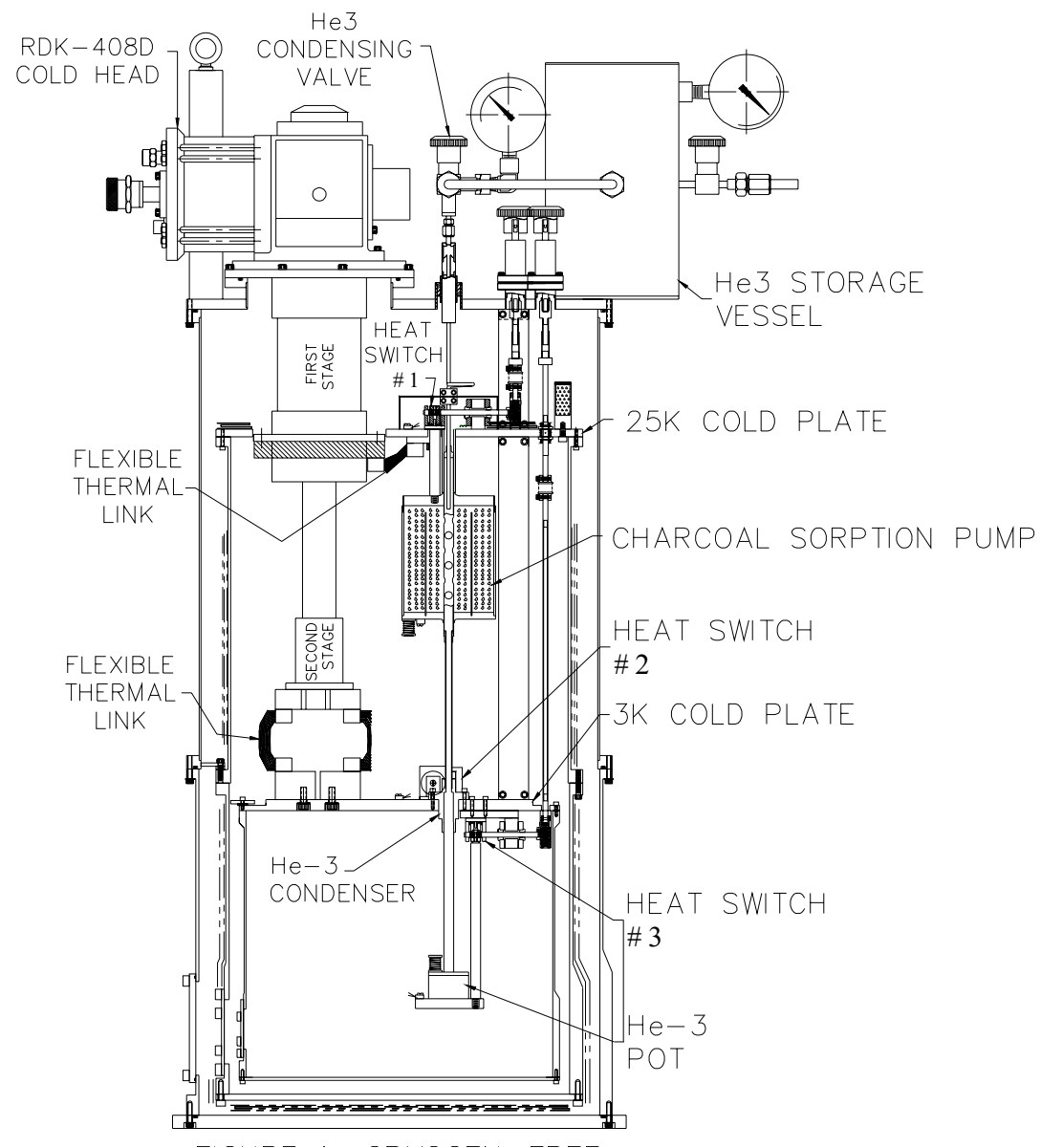


Fig. 1. Cryogen-free Helium-3 refrigerator

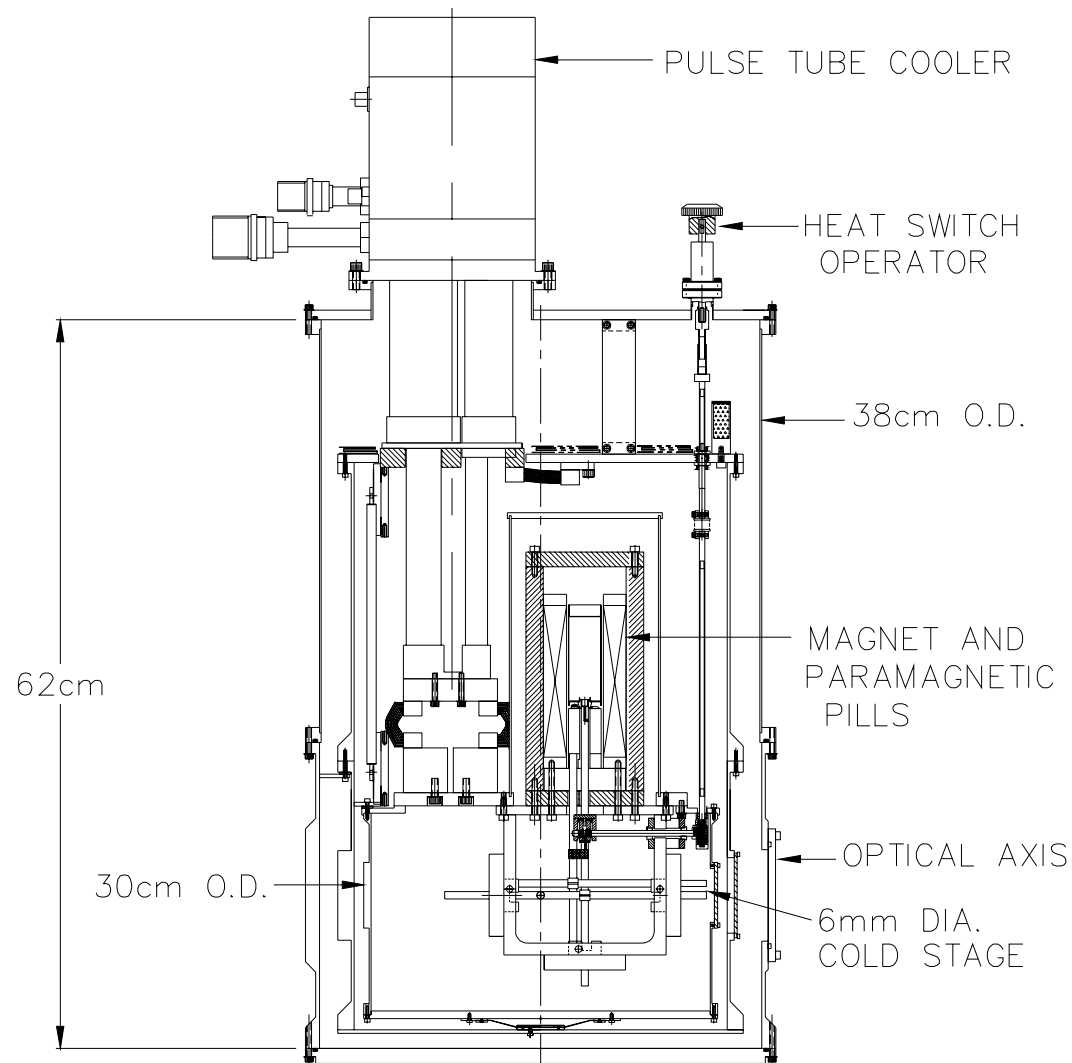


Fig.2. Cryogen-free two stage adiabatic demagnetization refrigerator

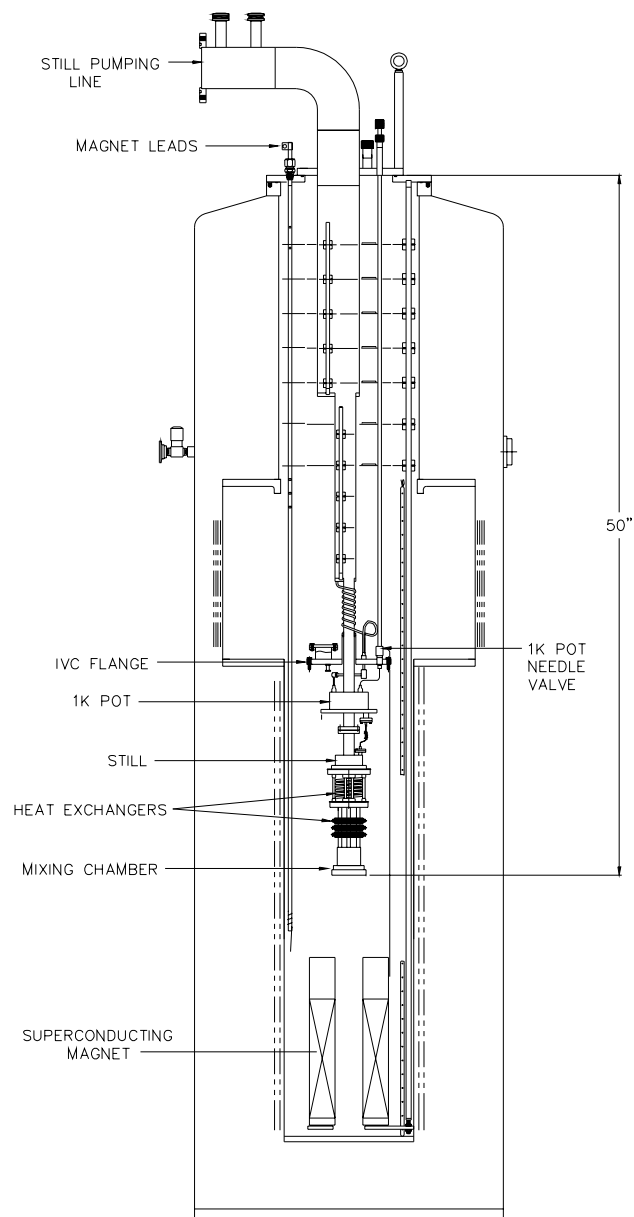


Fig. 3. JDR-100 Dilution Refrigerator System with 2 inch bore magnet and 100 l nitrogen-free dewar (IVC and shields removed for simplicity).

# Low-temperature thermometry

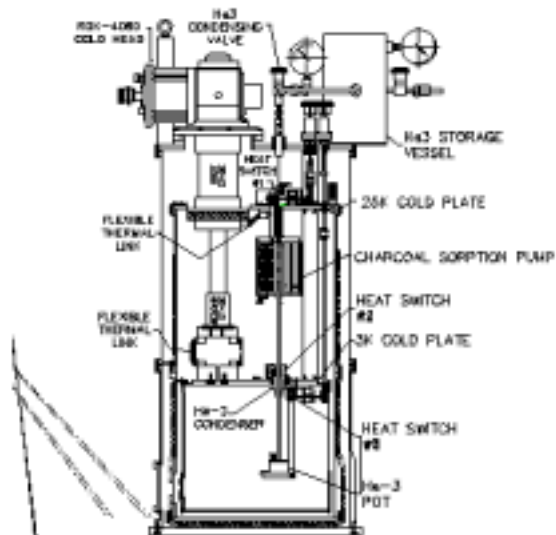


FIGURE 1: OXYGEN-FREE HELIUM-3 CRYOSTAT

