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C2Or1B-01: Development of a Helium recondensing cryostat

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The present paper illustrates a case study in the progress of ongoing research work to develop a 100 litre Helium cryostat with in-situ recondensing facility. The cryostat with a cryocooler sock comprises of 46 components assembled in an optimal sequence. Cryostat development involved thermal load estimation, mechanical design, fabrication of components and sub-assemblies. The cryostat deploys a two stage Gifford McMahon cryocooler with appropriate cooling capacities available on I and II stage. The thermal load due to cryostat assembly is estimated as 34 W and 300 mW for I and II stage of cryocooler respectively. Experimental trials are conducted for testing of cryostat with recondensing cryocooler. The first no load trial in vacuum produced unsatisfactory results. Appropriate modifications are carried out in the assembly which resulted in no load temperatures of 51.95 K on I stage and 3.43 K on II stage. At heater load of 0.448 W, the II stage attained temperature of 4.21 K with I stage temperature stabilized at 52.47 K without any heater load on I stage. Temperature increased from 51.95 K to 52.47 K for I stage showing 0.448 W cooling capacity available at II stage for recondensation at 1 bar pressure. The paper highlights these modifications towards successful development of Helium recondensing cryostat.

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