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Commissioning of the Cryogenic Safety Test Facility PICARD

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The sizing of cryogenic safety relief devices requires detailed knowledge on the evolution of the pressure increase in cryostats following hazardous incidents such as the venting of the insulating vacuum with atmospheric air. Based on typical design and operating conditions in liquid helium cryostats, the new test facility PICARD, which stands for Pressure Increase in Cryostats and Analysis of Relief Devices, has been constructed. The vacuum-insulated test stand has a cryogenic liquid volume of 100 liter and a nominal design pressure of 16 bar. This allows a broad range of experimental conditions with cryogenic fluids. In case of helium, mass flow rates through safety valves and rupture disks up to about 3.5 kg/s can be measured. Beside flow rate measurements under various conditions (venting diameter, insulation, working fluid, liquid level, set pressure), the test stand will be used for studies on the impact of two-phase flow and for the measurement of flow coefficients of safety devices at low temperature. This paper describes the layout and the design parameters of the test stand and presents first experimental data from the commissioning phase.

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