2 K SUPERFLUID HELIUM CRYOGENIC VERTICAL TEST STAND OF PAPS

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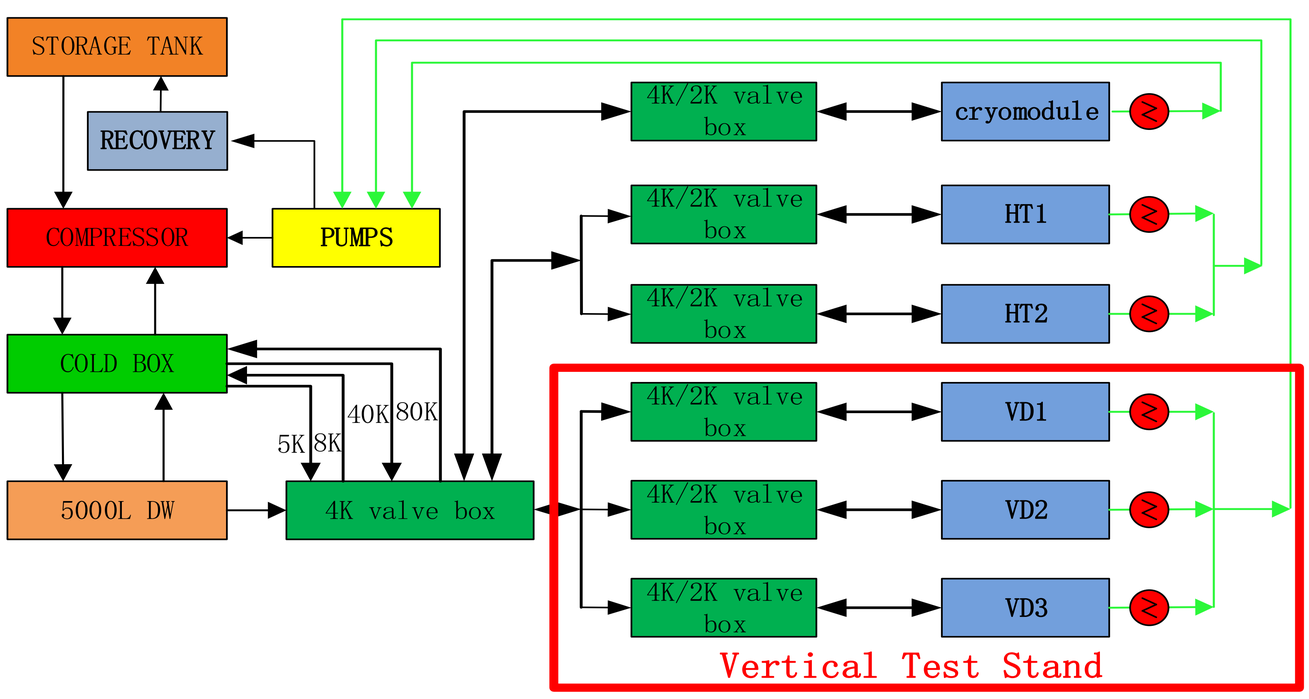
Abstract

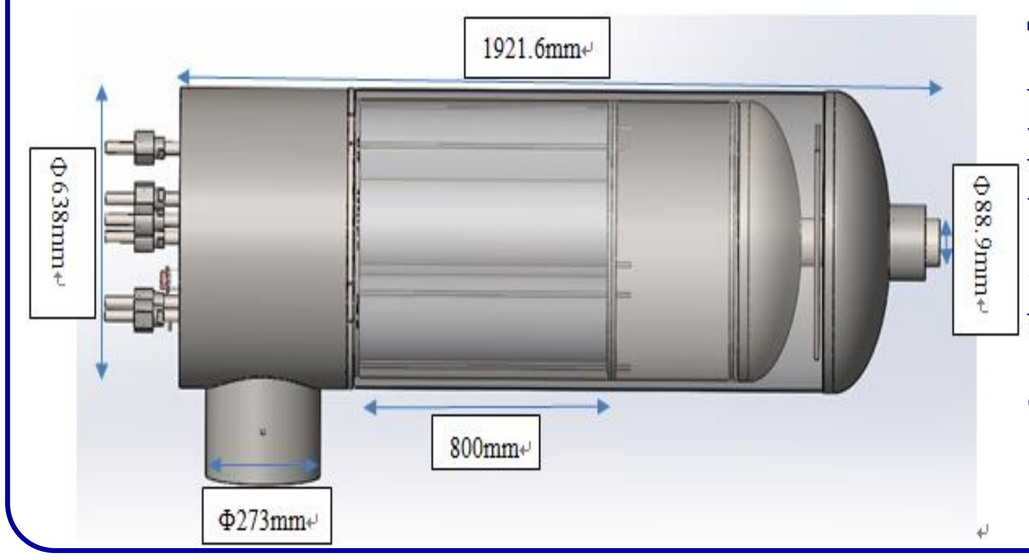
Platform of Advanced Photon Source Technology R&D (PAPS) in the Institute of High Energy Physics (IHEP) is an ongoing project, which aimed to provide a comprehensive research and testing platform for the particle accelerator, X-ray detection and optics. As one of the important parts of the platform, cryogenic vertical test stand for the superconducting cavities is composed of three big vertical test cryostats with 2 different inner diameters, which can provide 4.5K liquid helium, 2K superfluid helium and the lowest 1.5K environments according to the cavities test requirements. Because of the big size of the cryostats and certain scale, the finished cryogenic vertical test stand can meet several different type cavities test, such as 1.3GHz 9cell, Spoke, elliptical, etc. And also can provide the cavities' mass vertical testing for the large scale superconducting accelerators.

1. The cryogenic system of PAPS



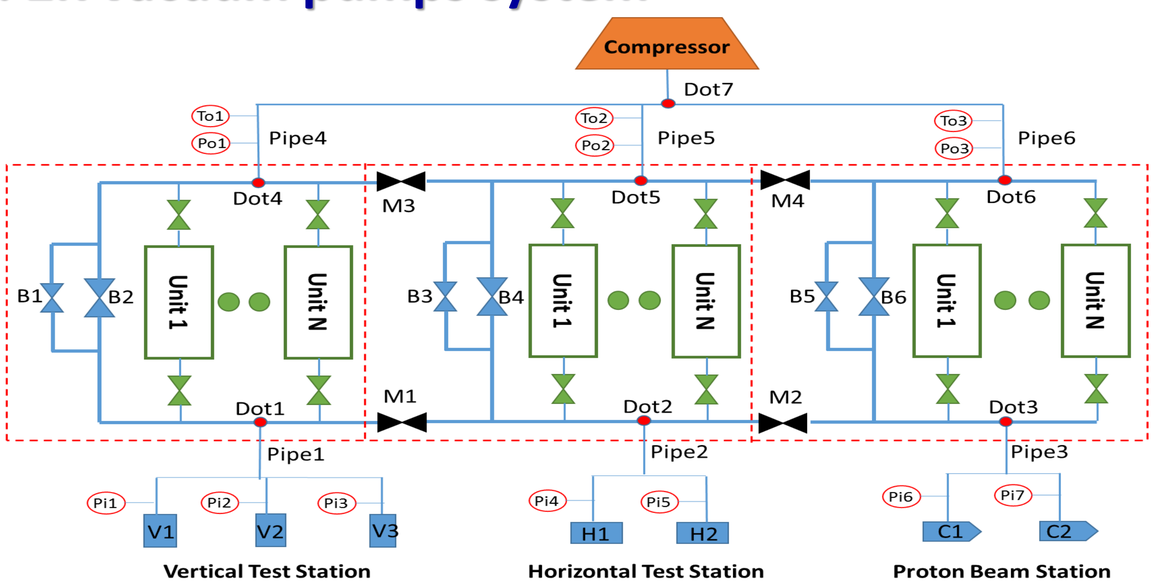
This system will be used for vertical test stand, horizontal test stand and a beam test stand.

2. Electrical Heater



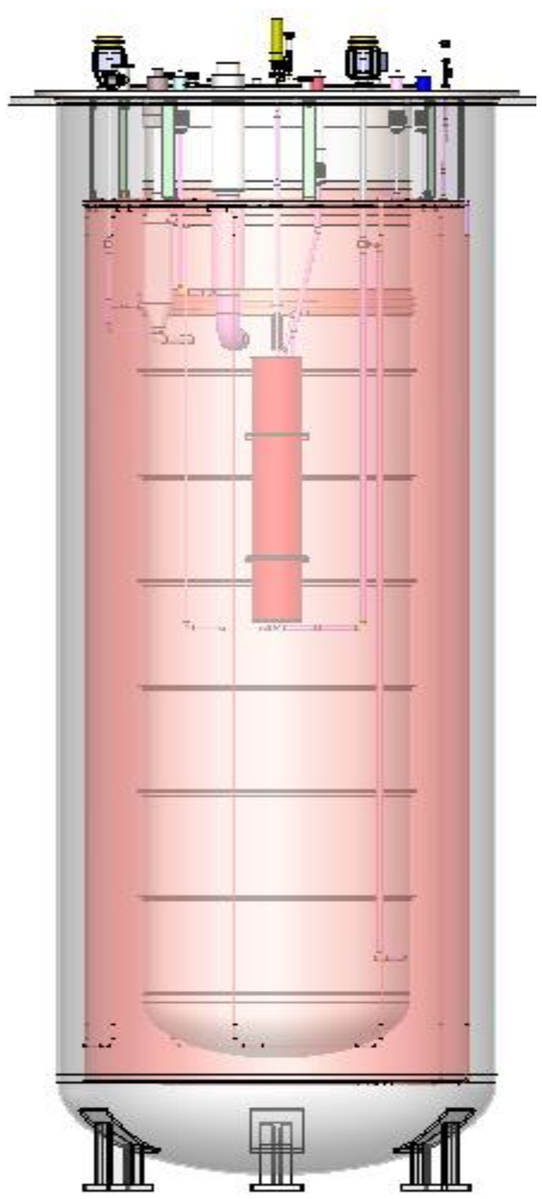
The electrical heater can heat the cold gas to room temperature about 300K

3. 2K vacuum pumps system



Parameter	Value
Helium tank pressure	3129 Pa
2K cooling capacity	120W
Pressure stability	±10 Pa
Max mass flow	26.7 g/s
Leakage rate	1E-6 Pa·m3/s

4. Three-dimensional structure of vertical test cryostat



2K Vertical Test Dewar is an integrated cryostat, which includes liquid helium Dewar, phase separator, J-T heat exchanger, J-T throttling valve, etc.

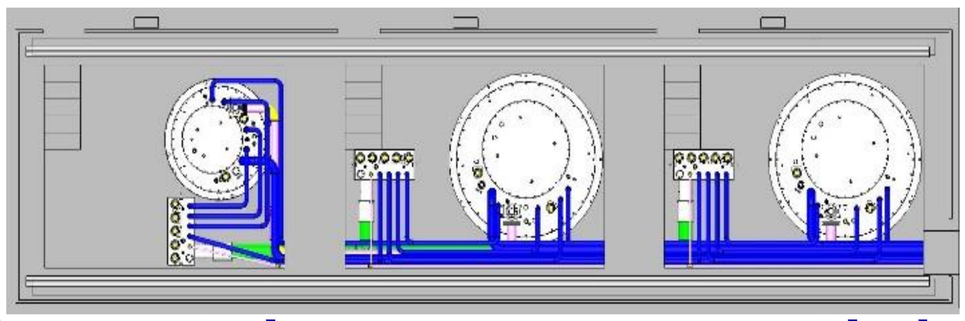
Size:

Inner diameter: Φ1260×4935mm

outer diameter: Φ2072×5535mm

total height : 6270mm

5. The layout of three vertical test cryostats



Three vertical test cryostats can provide the cavities' mass vertical testing for the large scale superconducting accelerators.

6. Superconducting cavities

The finished vertical test stand can meet different type cavities test

Double Spoke cavity

Spoke cavity

166.5MHz cavity

650MHz cavity