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# Design and constructions of an in-situ cell for neutron diffraction studies

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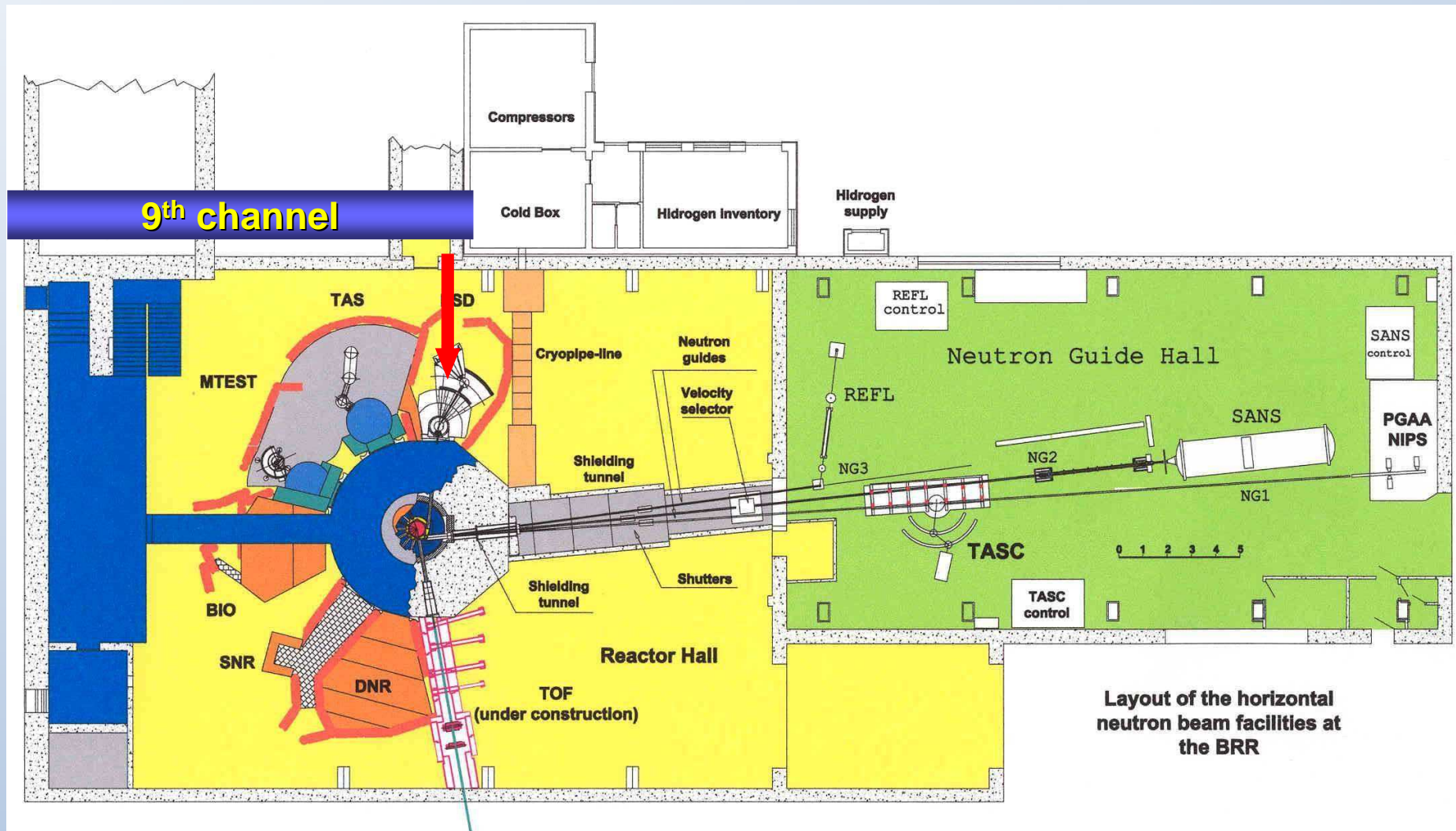


# Introduction

- Nowadays there is an increasing interest in phase transition research.
- There is no equipment for this experiment, therefore we began to build one
- We use high pressure and temperature in this system.
- Neutron diffraction is used for measurement in the equipment

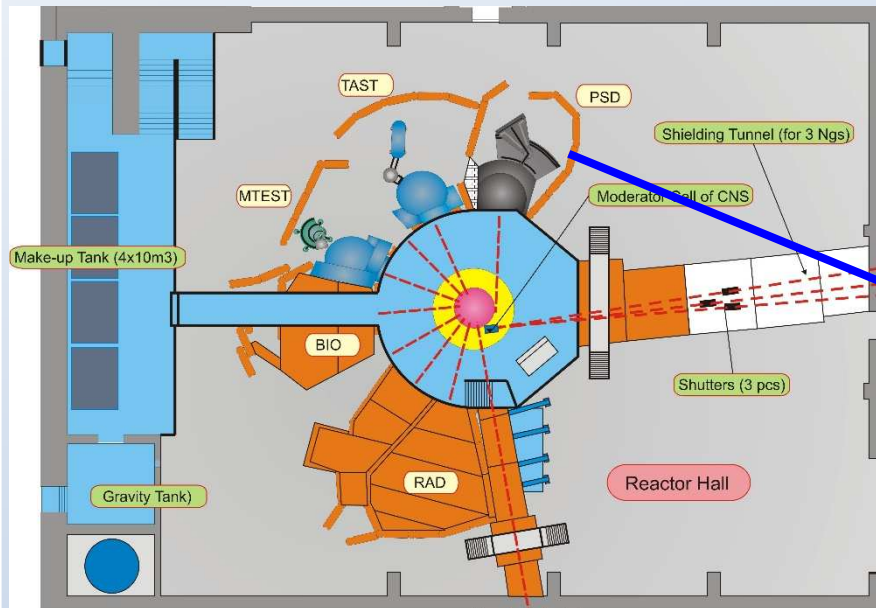


# Measuring area





## Characterization of the **PSD** diffractometer



Cu(111) crystal  
monochromator  
 $\lambda = 1.07\text{\AA}$



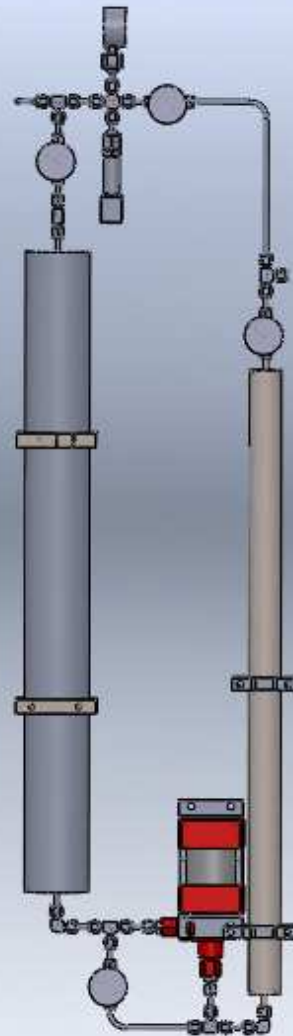
He-3 linear sensitive position (60cm)  
detectors



# Boundary conditions

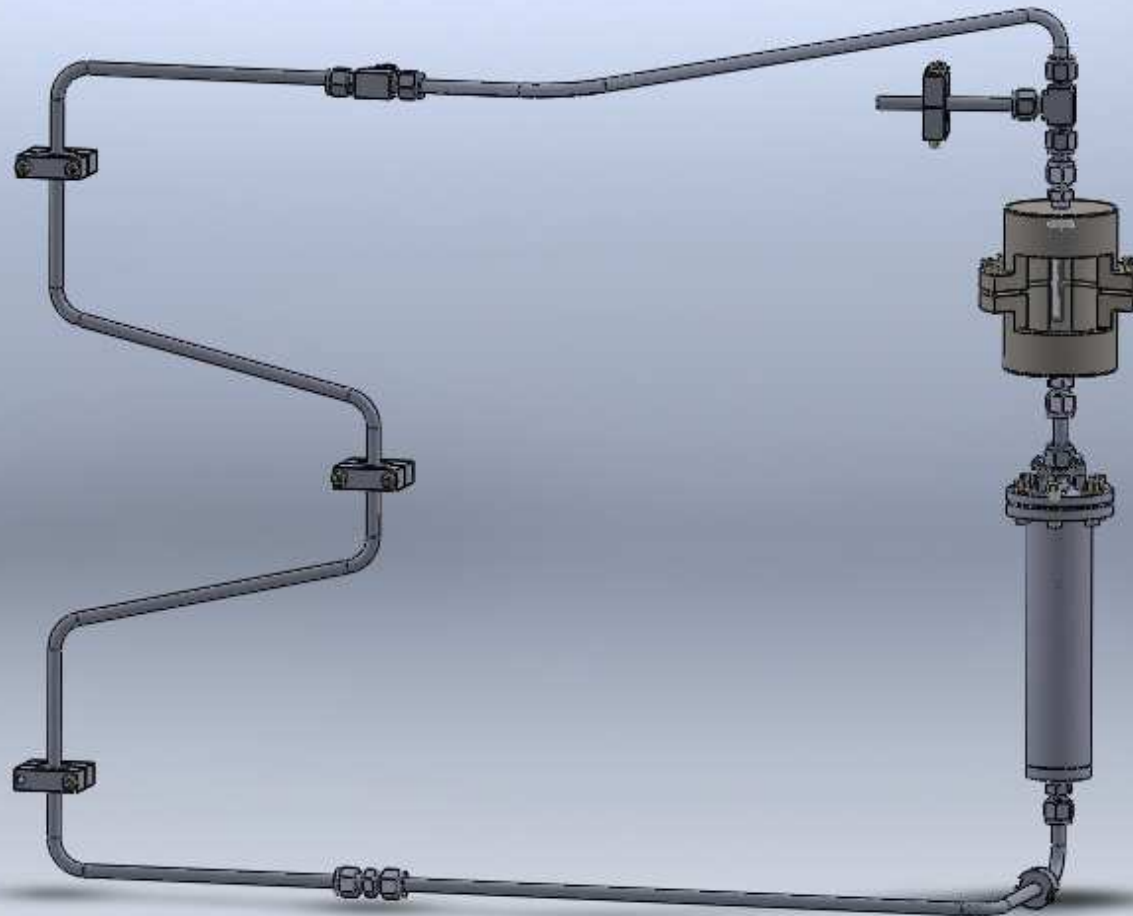
- Pressure: 0-300 bar
- Temperature: room-900°C
- Gas: CO<sub>2</sub>, neutral
- Materials for neutron diffraction:
  1. Sapphire
  2. TiZr (52,5w% Ti/47,5w% Zr)
- The equipment must be portable
- The equipment should have Small size







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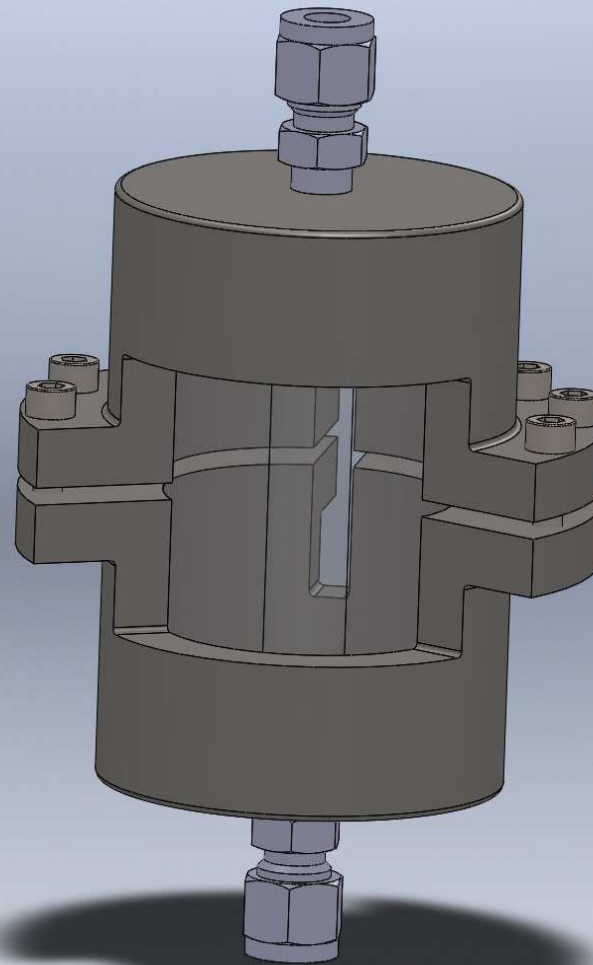






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## Insitu-cell desing 2.

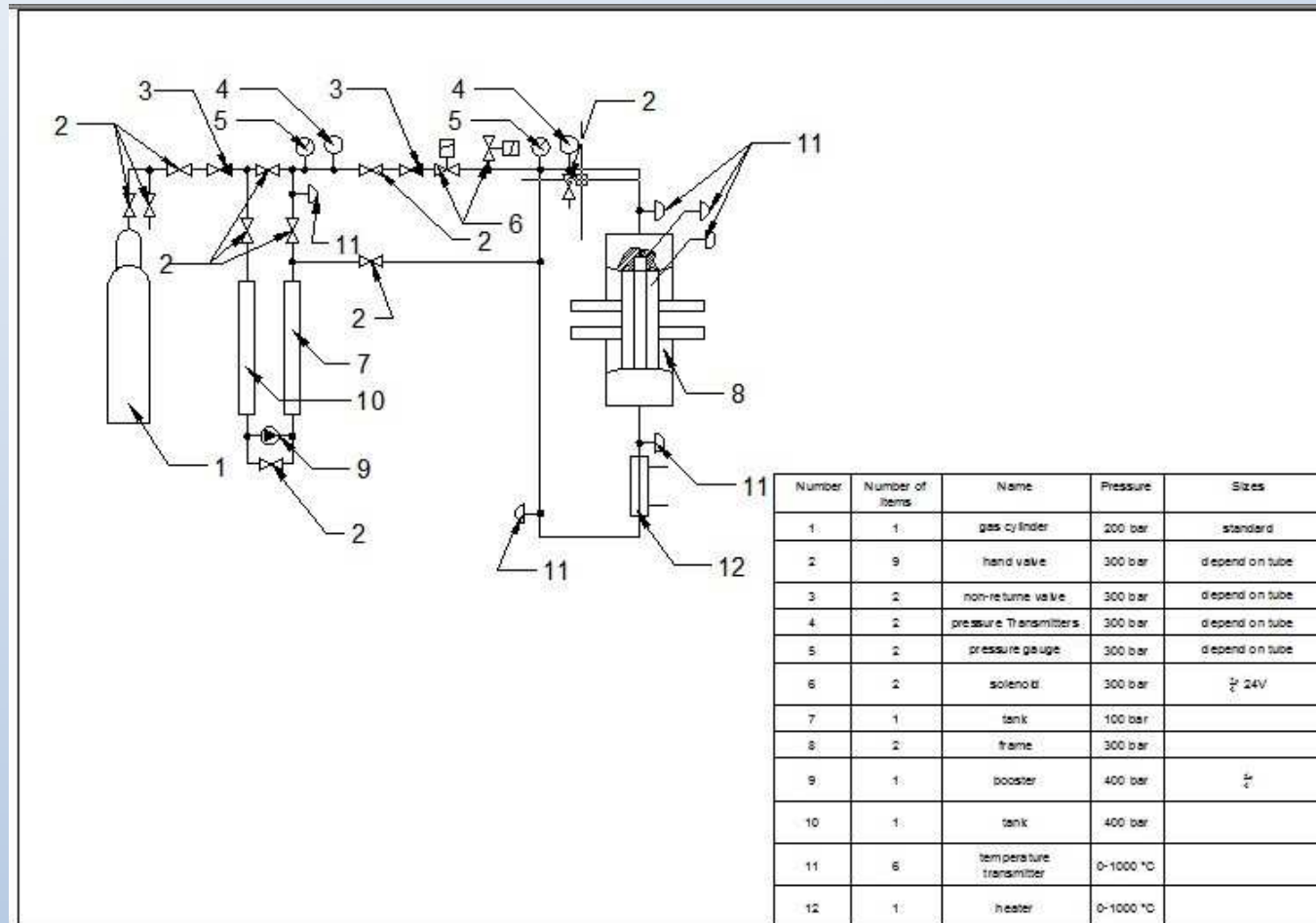
- Low temperature  $t < 500^{\circ}\text{C}$
- Big pressure  $P = 300\text{bar}$
- We can use TiZr in these periods
  
- High temperature  $t < 800^{\circ}\text{C}$
- Pressure  $P = 100\text{bar}$
- We can use Sapphire in these periods

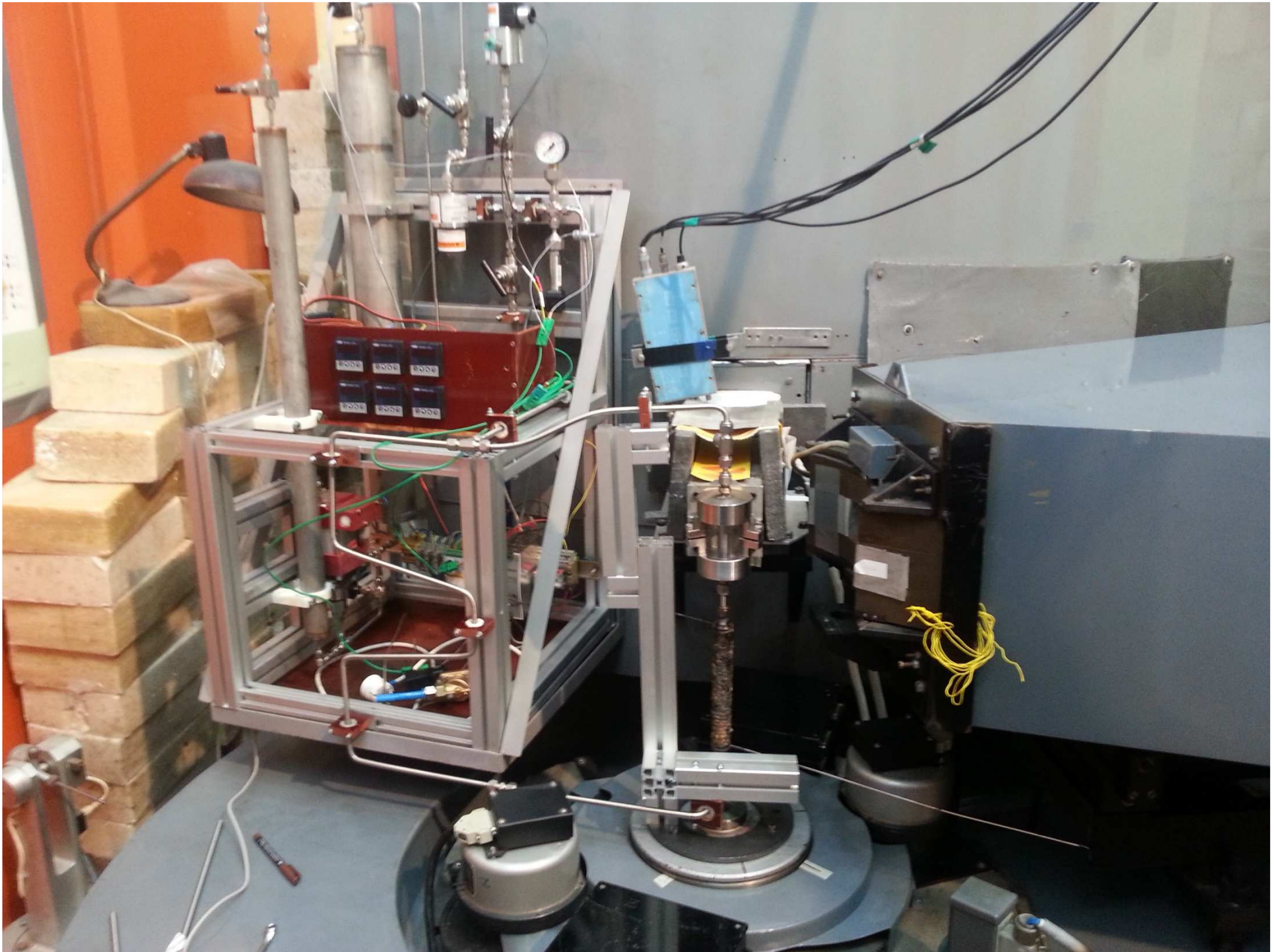


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# System plan







## Problems

- Seals
  - The O rings do not tolerate the high temperature and CO<sub>2</sub>
  - The copper do not tolerate the high temperature
  - Probably the solution is to use conical surfaces
- Heater
  - The heater should be dismantable
  - When we use the heater for a long time glass fiber mats insulation are not enough we will have to use vacuum for insulation





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**Thank you for your attention!**