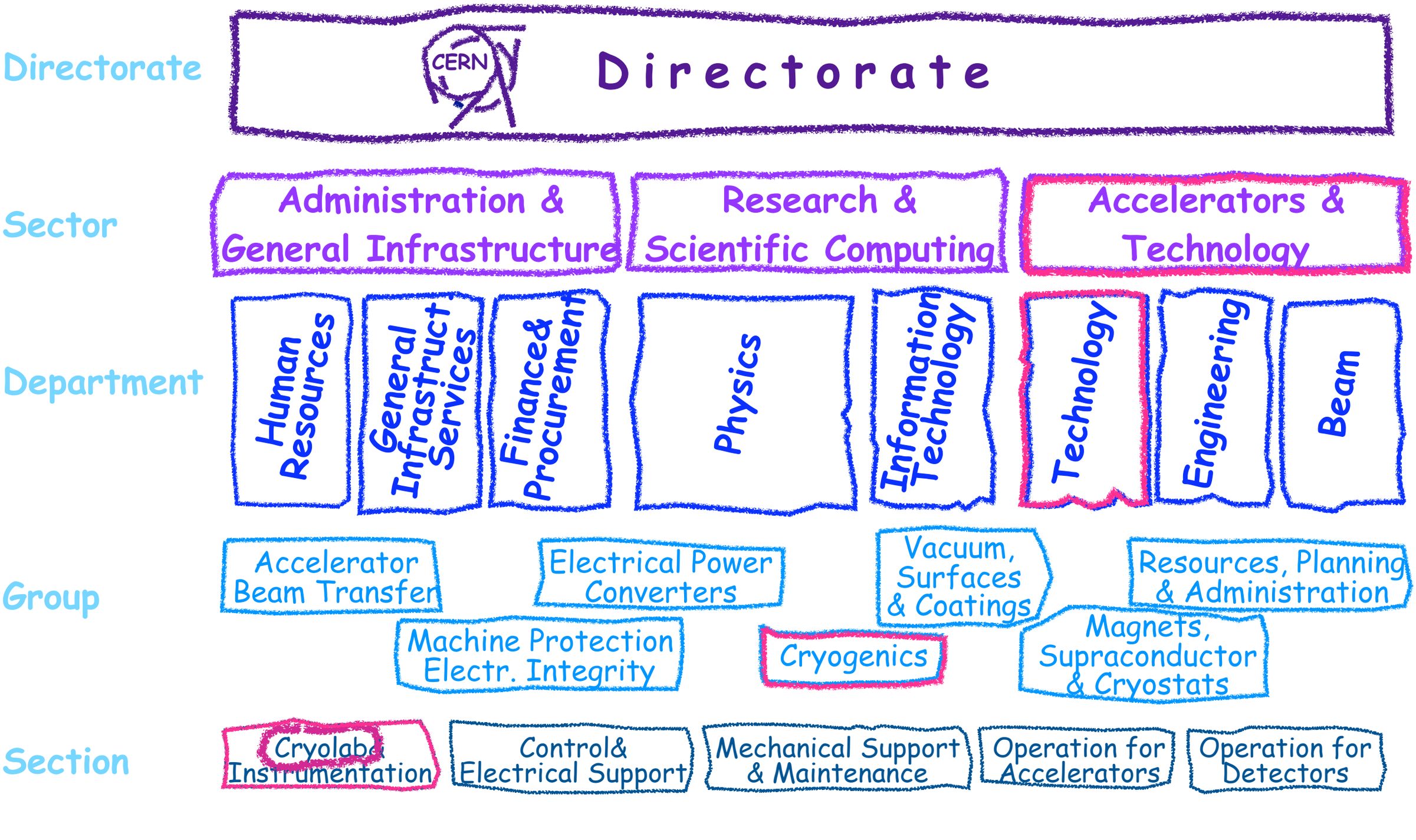
Welcome at the Cryolab*!

*CERN Central Cryogenic Laboratory

Where is the Cryolab?



What we ~~do?~~ are asked to do?

On clients request we provide service

in- & outside CERN

- Consultancy ..... Cryogenic design, instrumentation & safety
- Infrastructure ..... Provide test facility at the Cryolab
- Cryogenic System ... Design, build-up & commissioning
- Complete project .... As above + operation, measuring, data analysis,...

What are our tools?

- Cryogens . . . . . Liquid Helium and Nitrogen
- Storage vessels . . . . Cryostat and dewar
- Lines . . . . . Transfer, recuperation and pumping
- Pumping units . . . . . Primary and secondary pumps
- Instrumentation . . . Sensors, actuators, connectors
- Operation station . . Data acquisition and control system

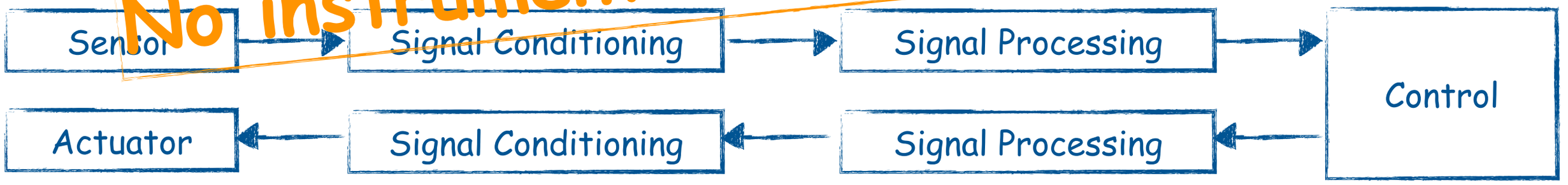
Typical post at the Cryolab

Instrumentation

Definition

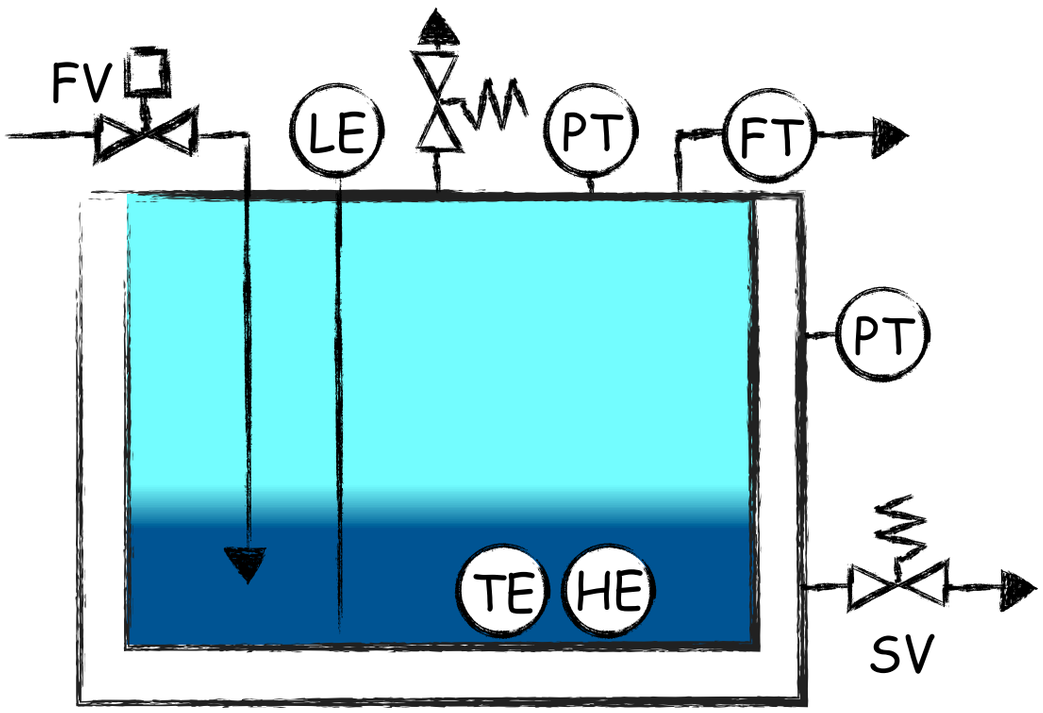
♫ Combination of musical instruments ⚙Branch of engineering dealing with measurements

Measurement Chain



No instrumentation - No cryogenics

Sensor & Actuator in He Cryogenics



Piping & Instrumentation Diagram

Measuring mainly based on 3 elec. principles:

- resistance
- capacity
- inductance

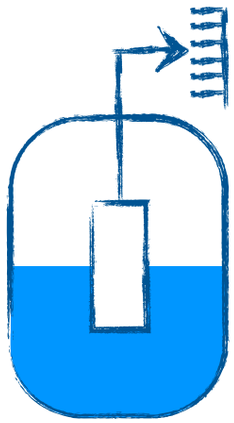
Particularities

- electrical wires: heat load, self heating effect thermal EMF
- openings of cryostat: tightness, heat load
- mounting: 'cryoproof', thermal expansion

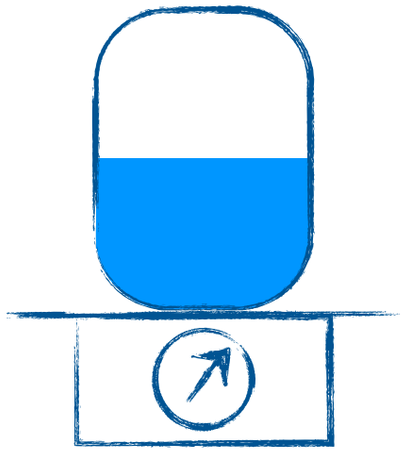
F - Flow, L - Level, P - Pressure, T - Temperature, H - Heater, V - Valve

Level

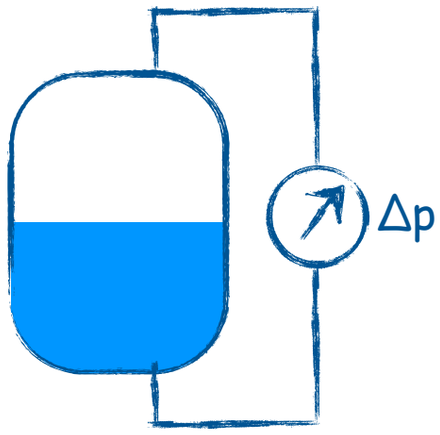
Mechanical Level Sensor



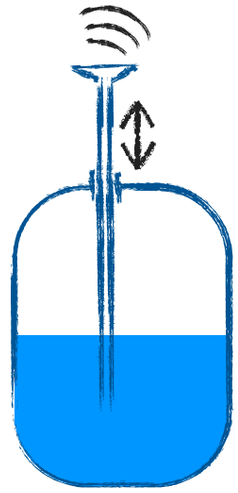
Float



Weighing

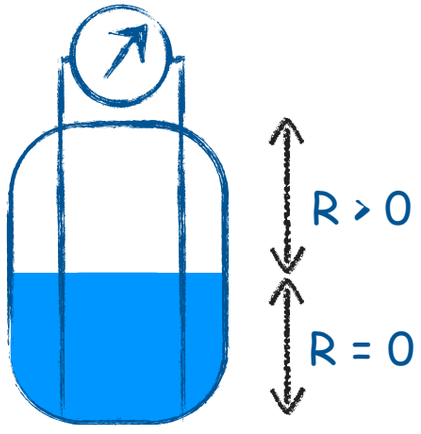


Hydrostatic
Pressure Difference

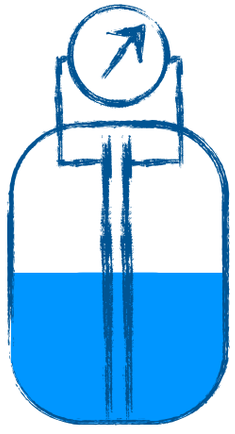


Bubbler
(Thermoacoustic Oscillation
TACONIS Effect)

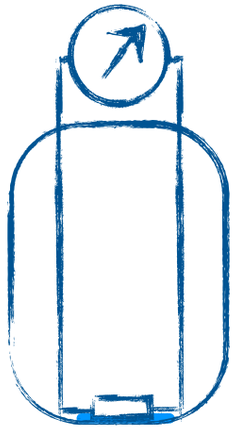
Electrical Level Sensor



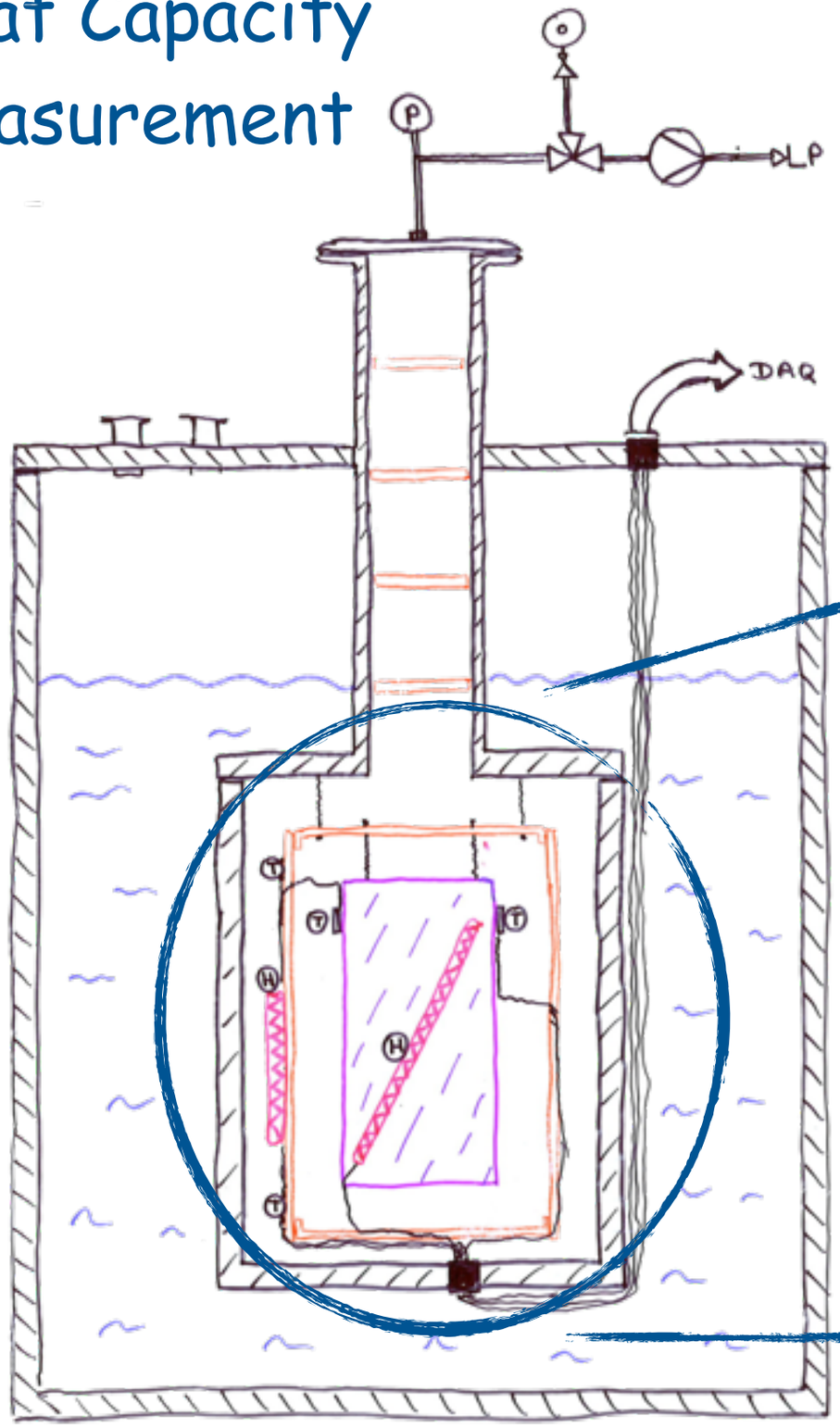
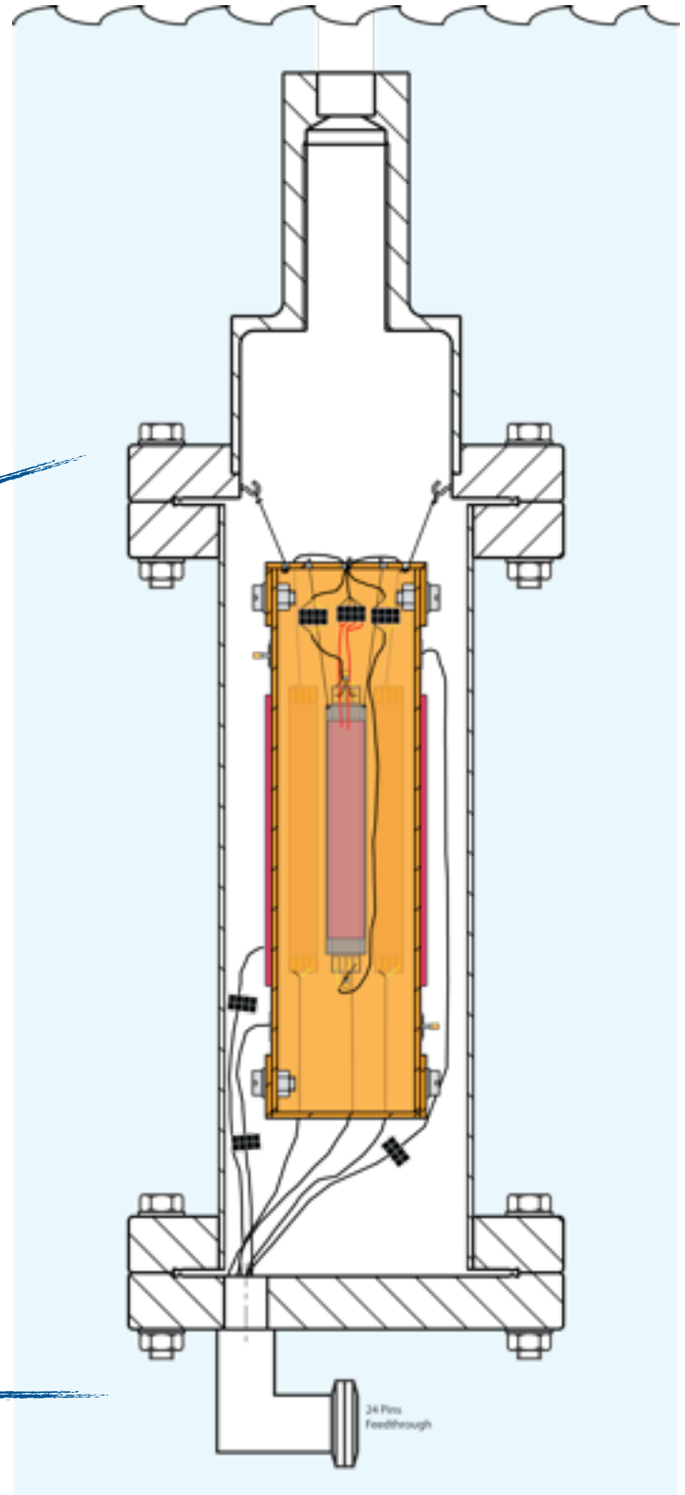
Superconductor



Capacitor
$C = \varepsilon \cdot A/d$



Resistor

Setup

Heat Capacity Measurement