

## Design of a new Magnetic Gravity Compensation device for liquid hydrogen

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**PhD may follow:** Yes

### Summary :

The Low Temperature Laboratory (SBT) at CEA-GRENOBLE studies a new magnetic levitation device for liquid hydrogen. The objective of this ground-based facility is to simulate the behaviour of this fluid in microgravity. For it, magnetic gravity compensation is generated in supraconducting coil systems.

The trainee will have to perform magnetic and mechanical conceptual design of this new magnetic levitation device.

### Full description :

The Low Temperature Laboratory (SBT) at CEA-GRENOBLE develops and operates since ten years experimental devices for the magnetic levitation of fluids used in space applications : in most cases liquid hydrogen and oxygen. The objective of these ground-based facilities is to simulate the behaviour of these fluids in microgravity. For it, magnetic gravity compensation is generated in supraconducting coil systems installed in the SBT. The laboratory would like to increase its experimental capacity in magnetic levitation for liquid hydrogen.

Based on previous design studies and experimental results, a conceptual study for a new magnetic levitation device for liquid hydrogen is undergoing. This study will define the new superconducting magnetic system able to levitate at least 1 cm<sup>3</sup> of liquid hydrogen with a possible adjustment of the distribution of residual magnetic force with a 1 % precision. This new magnetic levitation device will significantly increase present performances raised on the HYdrogen Liquid Device (HYLDE) used by SBT, but on small volumes (qq. mm<sup>3</sup>) and without control of the residual force distribution.

**Requested skills :**

Candidate shall have theoretical knowledge in magnetic and mechanical design. Experiences with modelisation and simulation softwares (such as Matlab, Mathematica, Radia, Ansys) would be an asset.