Levitating superconductors for superfluid helium dynamical studies

Project type	student project
Language	česky / slovensky / english
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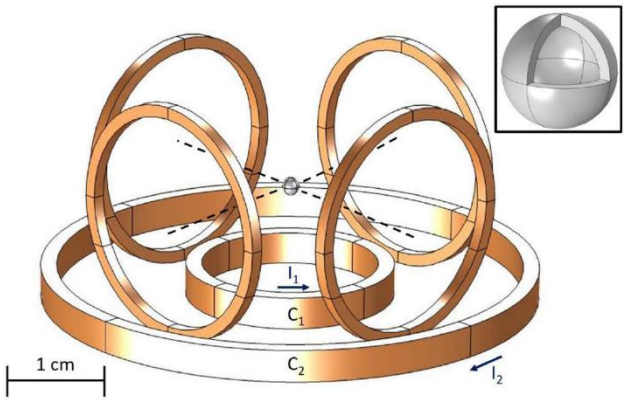
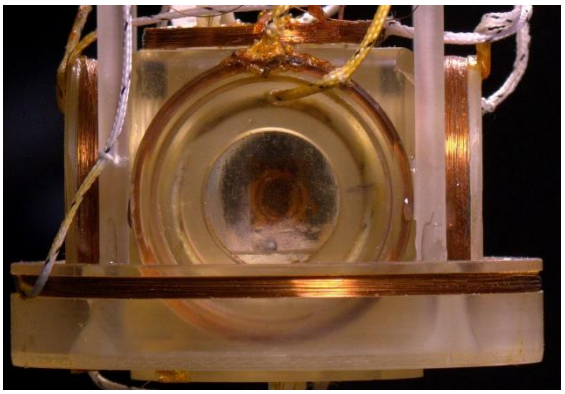
Laboratory	Laboratoř (MFF Troja)
Keywords	Superconducting levitation, Superfluid helium
Workload	4 months





Working with liquid helium, boiling at temperature around 4 K, and cooling it bellow 2.2 K, one can observe the transition into its superfluid state. In this new liquid phase, we can observe inviscid transport of the fluid and occurence of very specific rotational flow, restricted to so-called quantum vortices – subatomically thin line defects in the superfluid. Levitating superconducting probes can be used with great advantage to study dynamical character of classical and superfluid flows.

Project Aim

The goal of the Project is to built and experimentaly test the setup allowing to magnetically levitate light superconductor-covered objects. Pair of oppositely oriented superconducting coils driven at units of amperes of current can produce sufficient magnetic field. All tests will be executed at cryogenic temperatures below 4 K in glass cryostat.

Co se naučíte / What you will learn

Student will gain basic theoretical knowledge of cryogenic experiments and superfluid helium dynamics. Further, the practical skills of preparation and run of experiments involving superfluids at temperatures below 4 K. During the initial stage of the Project student will be working with 3D modelling program to prepare coil formers for 3D printing and winding.

Key milestones

1st month:	Inroduction, Literature review, Setup design, Plastic parts printing
2nd month:	Coil winding, Setup assembly, Superconducting layer coating
3rd month:	Setup mounting into cryostat, Cryogenic testing
4th month:	Setup optimisation, Report writing

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