

## Development of a Two-Axis Rotator

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### Introduction

One-axis rotators are extensively used during a long time at the all NHMFL systems and allowed to perform experiments where alignment or rotation of a sample with respect to magnetic field is important. A two-axis rotator is a desired improvement of the NHMFL toolset. Commercially available one-axis rotator made by Attocube Systems AG [1] has been tested at the SCM2 system as a part of a two-axis tool.

### Experimental

Attocube piezoelectric rotator ANRv50/LT which is designed for operations in high magnetic fields and at low temperatures has been installed in the modified body of our standard mechanical rotator used at SCM2. Two Hall probes were used to control the rotator alignment with respect to magnetic field. The probes were mounted on the ANRv50/LT and oriented in directions parallel and perpendicular to the rotator plate, respectively. The rotator has been tested in magnetic fields 3T and 18T and at temperatures 1.6 and 0.3K. An example of the signal obtained is presented in Fig. 1.

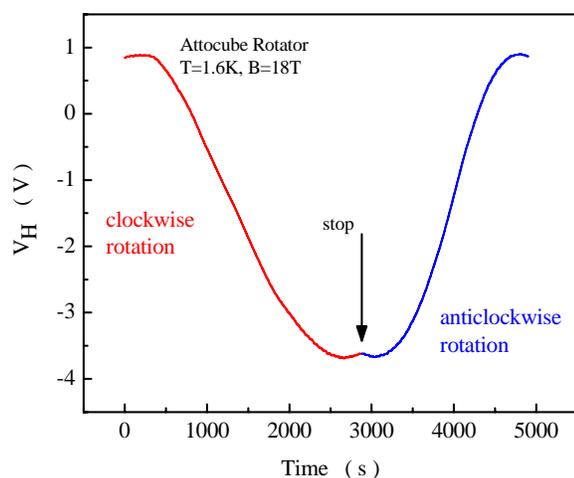


Fig.1. Time dependence of the Hall probe signal during a run of the rotator with different rates (and directions) selected.

### Results and Discussion

We were able to align the Hall probes to a desired position. An extra heating was observed during run of the piezoelectric stage ( $\text{He}^3$  bath temperature increased from 0.3K to 0.5K) and  $\text{He}^3$  has been evaporated after about 7 hours of continuous rotation. We also found that due to the resistance of the twisted pairs and stainless steel coaxial cables they can not be used to run the piezoelectric rotator. It is why GORE coaxial cables were used to run the piezoelectric stage.

### Conclusions

The rotator can be used for some experiments, but it makes much worse cryogenic parameters of the system. High frequency experiments are impossible if the piezotorator is installed since the GORE cables are used to run the rotator.

### References

- [1] <http://www.attocube.com/>