

Report on long-term dispatch program in Helmholtz Zentrum Dresden Rossendorf

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## Abstract

I stayed at Helmholtz Zentrum Dresden Rossendorf (HZDR) from June 26 to July 25 in 2016. Dr. Sergei Zherlitsyn accommodated me. Only this institute has succeeded in ultra-sound measurements up to 70 T (tesla) in the world, so I decided to go there to do some ultra-sound experiments under high magnetic fields.

The purpose of our experiments is to do ultra-sound experiments with two types of samples. One is  $S = 1$  spin ladder compound and the other is Kondo-semiconductor material. I had consulted Dr. Zherlitsyn in advance before I arrived in Germany. We took 2 weeks machine time for perfecting our experiments. We need to submit an abstract for the experiments in advance.

Our machine time was 2 weeks, but it takes time to set-up and analysis so we've decided to extend my stay for one month.

## Experiment

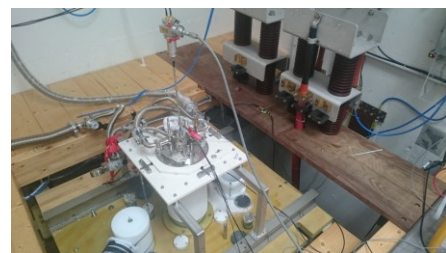
### Purpose

I brought two kind of samples;  $S = 1$  spin ladder compound and Kondo-semiconductor material. For spin ladder compound, according to our experimental results in ISSP (Japan), lattice deformation occurs when a magnetic field is applied. So the purposes of our experiments is to observe an evidence of lattice deformation by ultra-sound experiment. For Kondo-semiconductor material, the purpose is to observe an anomaly of sound velocity propagating in this material at about 50 T where metal non-metal transition occurs.

### Experiment

I prepared sample set-up by myself. Dr. T. Nomura and Dr. C. Pham generated magnetic fields and measured. During my stay, we had some ultra-sound measurements in static fields up to 17 T using superconducting magnet, and in pulsed magnetic fields up to 60 T for two samples.

We got a meaningful data in both samples.



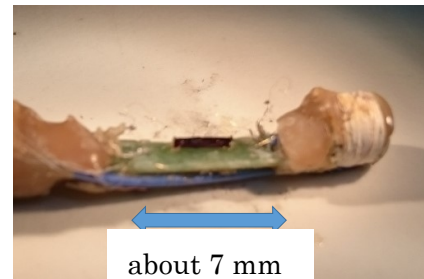
Magnet generating magnetic field up to 60 T

### Daily life in HZDR

I stayed in a guest house located in HZDR. We can live there without any problems. However a restaurant in HZDR only open in lunch time. So we need to cook breakfast and dinner by ourselves. I ate sausages every day. You can go to supermarket by bus.

Many scientists around the world stay at the guest house. I could get so close with young scientists.

I went to the city of Dresden for sightseeing on weekends. It takes about thirty minutes by bus. The city of Dresden is a historical city. Many tourists from all over the world come to Dresden either just to relax or enjoy the cultural attractions. I was so impressed with many places in Dresden. It's interesting to note that buses from the center city to HZDR usually leave every two hours on weekends.



A probe for ultra-sound measurements



Zwinger



Dr. Zherlitsyn and Dr. Nomura took me to sightseeing

### Acknowledgments

I'm deeply grateful to Dr. S. Zherlitsyn for accepting me, and Prof. Y. Matsuda, Prof. K. Kimura and MERIT program for giving me such a great opportunity. I want to thank Dr. C. Pham and T. Nomura for helping me a lot.