# Experimental report

13/09/2019

**Proposal:** DIR-146 **Council:** 4/2016

**Title:** Novel anvils for high pressure experiments: Superior, Cheaper, for Everybody (SINE20202 Task7.3)

**Research area:** Methods and instrumentation

**This proposal is a new proposal**


**Main proposer:** Stefan KLOTZ

**Experimental team:** Thomas HANSEN
Eddy LELIEVRE BERNA
Stefan KLOTZ

**Local contacts:** Thomas HANSEN


**Samples:** Fe2O3
NaCl
Pb
FeSe

| Instrument | Requested days | Allocated days | From | To |
|---|---|---|---|---|
| D20 | 5 | 5 | 24/05/2016 | 25/05/2016 |
| | | | 14/09/2016 | 15/09/2016 |
| | | | 07/10/2016 | 08/10/2016 |
| | | | 28/03/2018 | 29/03/2018 |
| | | | 19/06/2019 | 20/06/2019 |

**Abstract:**

Experimental report DIR-146: “Novel anvils for high pressure experiments: Superior, cheaper, for everybody (SINE20202 Task 7.3)”

Dates: 5 days over 3 years:
24-25.5. 2016, 14.-15.9.2016, 7.-8.10. 2016, 28.-29.3. 2018, 19.-20.6. 2019

Main proposer: S. Klotz

The purpose of this beamtime was to develop new anvils for Paris-Edinburgh pressure cells which have better pressure performance, are less expensive, and which can be used not only for neutron powder diffraction but also for inelastic measurements on triple-axis spectrometers. Another major objective was to make such extreme-condition (i.e. high P and low T) experiments more reliable and user-friendly. The beamtime falls within the framework of ILL’s and the applicant’s participation in the SINE2020 program, Task 7.3, which started in oct. 2015 and ends sept. 2019.
Five days of beamtime were allocated over a period of 3 years (1 day per cycle) which turned out to be very useful and successful. This beamtime lead to a number of developments which are currently testes in user-operation. The results were written up and submitted in July 2019 to the *Journal of Neutron Scattering*. We give here only the first page including the abstract, the paper will appear soon as a proper publication.

# Advances in the use of Paris-Edinburgh presses for high pressure neutron scattering

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**Abstract**. Paris-Edinburgh presses are nowadays the dominant high pressure devices for neutron scattering in the 10 GPa range and above. Here, we present developments of gasket-anvil assemblies with 30% improved pressure performance and considerably increased lifetime compared to the currently used “simple-toroidal” anvils, and giving nevertheless a similar signal-to-background ratio. We also present an improved Bridgman seal package which makes the low-temperature operation of the PE press significantly more reliable. A systematic investigation of background sources in the “equatorial” scattering geometry is reported.

Keywords. Neutron scattering, high pressure, Paris-Edinburgh press

(submitted 21.7.2019 to Journal of Neutron Scattering)

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