

Development of an argon box for stable beam collimation on MARIA instrument at the JCNS

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The neutron reflectometer MARIA with polarization analysis is dedicated for the investigation of thin interfaces like magnetic layered structures down to the monolayer scale and/or lateral structures. To maximize the signal to noise ratio the background scattering has to be kept as low as possible. Therefore the flight path of the neutrons before and after the sample should be not in air but in vacuum or in an atmosphere like Ar or He.

Because Ar is not cheap the goal is to run as long as possible with the filling a permissible box. Therefore after the initial Ar filling the Oxygen level is logged. As long it is below a certain threshold (e.g. 4.2%) no action is done. Above the threshold the box is filled with Ar by cycling with a slight overpressure. The detector box with a volume of about 2 m³ is fixed on a movable detector arm and is equipped with a complete set of feedthrough for the motors, encoders, pressure driven linear stages, water cooling system, detector and the ³He-filter in situ pumped SEOP filter. Oxygen sensors are also installed to allow a safe working place.

We present the technical details of the design and construction and will explain why we have chosen the Ar atmosphere on MARIA, why and how we combined the three requirements for being black for background neutrons, to be EMC-compatible and Ar tight at the same time.

Formal Invitation Letter Required

No

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