Soft X-ray XMCD at Ultra-Low Temperature

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Ultra-Low Temperature (ULT: bellow 1 Kelvin) is of primary importance when dealing with new states of matter and the studies of magnetic phenomena. On the DEIMOS beamline at SOLEIL synchrotron a new ULT refrigerator dedicated to soft X-ray Magnetic Circular Dichroism (XMCD) allows now users to perform experiments down to 220mK.

Preliminary experiments with an ErPd alloys and Fe_4 molecules demonstrate the outstanding performances of this new set-up, in terms of lowest achievable temperature under x-rays, the precision in temperature control over 4 orders of magnitude, the speed of the cooling down/warming up procedures and the strongly reduced eddy current power allowing fast scanning of the magnetic field during XMCD measurements.

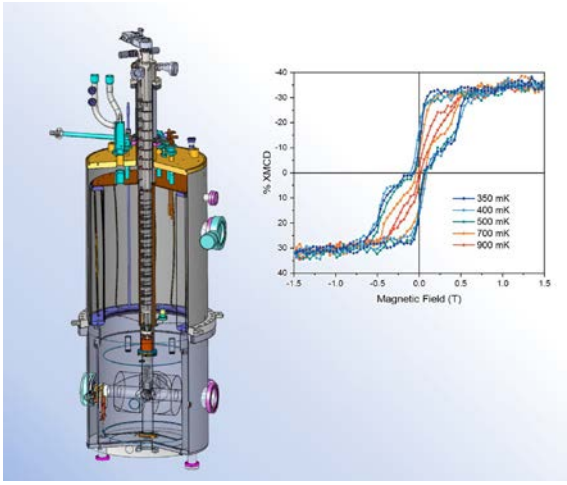

Figure 1: CAD of the cryostat. In the insert XMCD detected magnetization curves for of a monolayer of Fe_4 molecules in the 350-900 mK range.

In this presentation I will describe the modifications made to the 7 teslas cryo-magnet used on the DEIMOS beamline, to make it compatible with ULT. I will also present the thermometric measurements made to calibrate the temperature at the sample place.