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Upgrade of the 2 Tesla Electro-Magnet and Power Supply of the DEIMOS Beamline at Synchrotron SOLEIL

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DEIMOS (Dichroism Experimental Installation for MagnetOptical Spectroscopies) is the beamline built at French Synchrotron SOLEIL facility intended for soft X-rays magnetic and natural dichroism spectroscopies. It has been designed to enable most challenging measurements in terms of X-rays sample sensitivity and signal detection level. The energies accessible on DEIMOS beamline rank from 350 eV up to 2500 eV, with all polarizations (circular left and right, linear), covering the absorption edges of the elements most relevant to the magnetic nanostructure scientific community, i.e. the first (3d) and second (4d) rows transition metals L-edges, the rare earth elements M-edges and nitrogen, oxygen and sulfur K-edges. While its main end station, a 7 Tesla cryomagnet, allows for measurements down to sub-Kelvin temperature up to room temperature, its second end station, a 2 Tesla electromagnet, is currently under renovation thanks to the partnership between Italian power supply constructor OCEM Power Electronics and French electromagnet manufacturer SEF Technologies.
The coil is made of hollow copper to allow direct cooling in order to achieve the required 2 Tesla field strength. The magnetic model of this coil has been studied and validated before manufacturing. The new power supply will have a four quadrant fast switching topology, with a high stability output. To increase the reliability, the architecture is a proven modular technology coming from previous realizations running in other facilities. Once renovated, the so-called MK2T end station will allows for fast switching (1 Hz) between +/-2 Tesla. It will be aimed to host most peculiar inserts such as variable temperature liquid cell, high temperature (1000 K) and multiferroic inserts. Commissioning is expected as early as autumn 2022 and the facility could be available to users through standard review of the SOLEIL program committee, at the upcoming call for proposal.

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