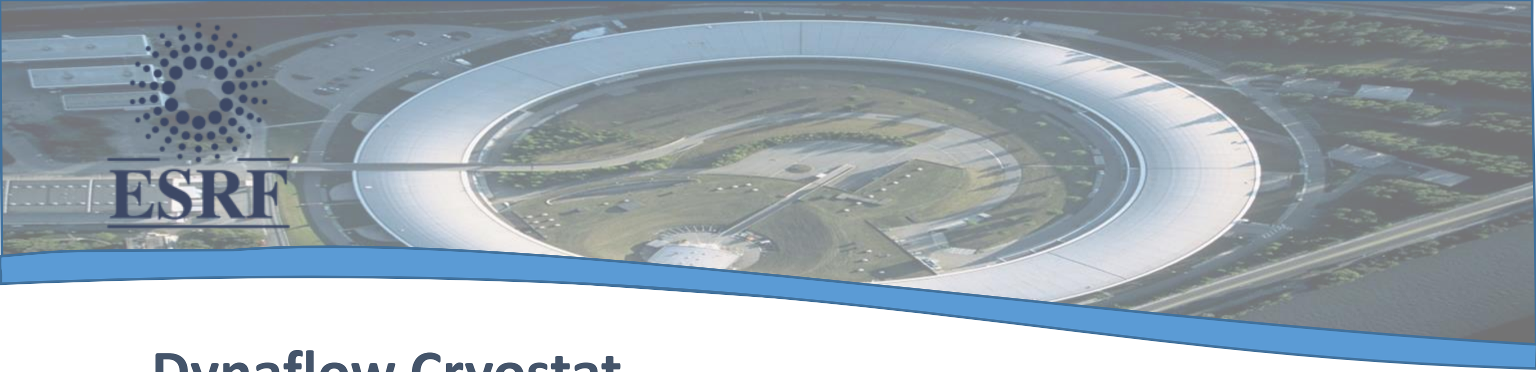
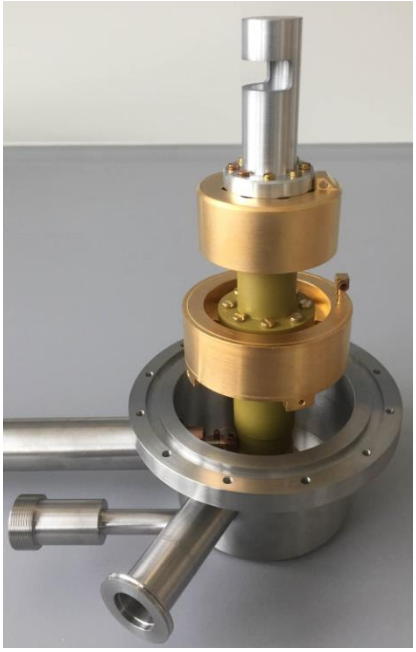


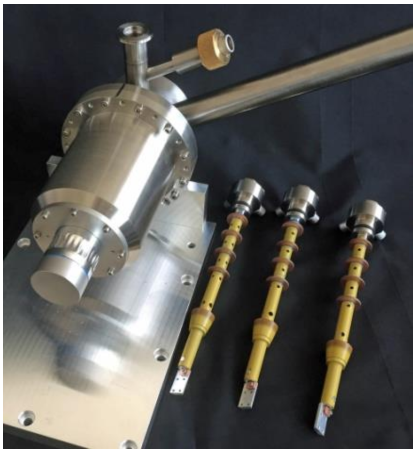
Dynaflow Cryostat

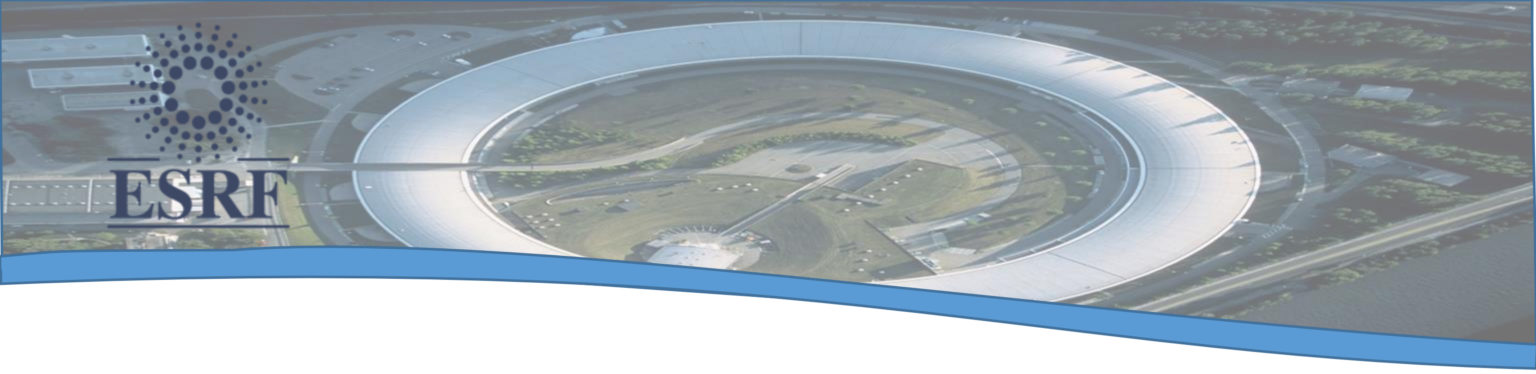
The Dynaflow Cryostat was designed at the ESRF to provide efficient sample cooling at very low temperatures (down to 2.5K). Unlike other cryostats where the sample is cooled in contact with a cold plate, the sample is positioned directly in the helium flow for enhanced cooling. The outer envelope of this modular compact construction is in stainless steel for high strength, whilst the cryogenic heat exchangers are made of copper for the best thermal conductivity. The thermally-isolating supports are made of Torlon®. The cryostat is designed to facilitate very quick sample replacement at low temperature by stopping the helium flow for a short time when the sample holder is removed and a new one is placed. Optical access to the sample is defined by the windows of the Inner Vacuum Chamber and Outer Vacuum chamber, and can be as large as 200 degrees.

Features



- **Modular compact rigid design in stainless steel, copper and Torlon®**
- **Operates in a large temperature range: 2.5 to 325 K**
- **Fast cooling: 60 min from room temperature to base**
- **Large angle optical access for different X-ray experimental configurations.**
- **Quick sample change**





Scope of the delivery

The cryostat is equipped with a calibrated Lake Shore Cernox® thermometer in the main heat exchanger and uncalibrated Lake Shore diodes in each sample holder. It is delivered with three sample holders, connecting cables, support, vacuum pumping lock, instruction booklet and spare O-rings.

Experimental results

An example of an experiment on ESRF ID20 is the RIXS study of the magnetic excitations in $CaIrO_3$, an antiferromagnetic insulator with post-Perovskite structure. In these experiments, it was necessary to lower the temperature below the Néel temperature of 110 K of $CaIrO_3$ to observe magnetic excitations. The temperature dependence of the RIXS spectra for a momentum transfer of Q = (1,2,9) shows the elastic line at zero energy loss to be much lower at low temperature; the peak at 0.04 eV and the broad distribution up to 0.3 eV are associated with the magnetic excitations. The almost temperature-independent broad distribution between 0.4 and 0.8 eV is associated with spin-orbital transitions. The influence of temperature is clearly visible in the RIXS response and can be directly linked to a change in physical properties of the system under study.