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Multi-Analyser Spectrometers & Milli-Kelvin Crystal Temperature Stabilisation

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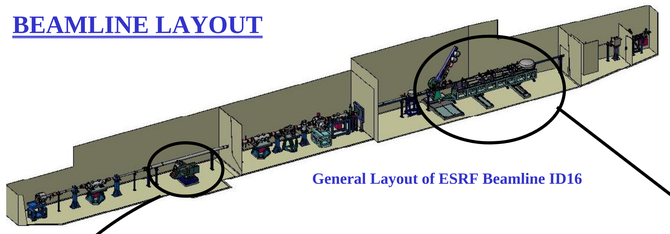
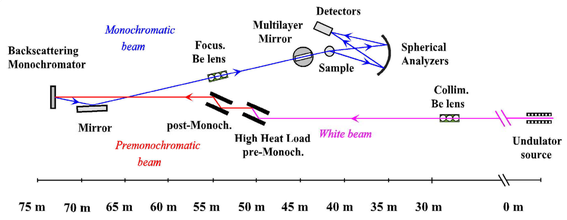
Introduction
ESRF beamlines ID16 & ID28 are dedicated to high and very high energy resolution inelastic X-ray scattering experiments. During the last 2 years an important upgrade has been made on the very high energy resolution horizontal spectrometers at both ID16 & ID28, and also the Raman spectrometer at ID16. All 3 of these spectrometers now operate routinely with 9 analyser crystals.

BEAMLINE LAYOUT

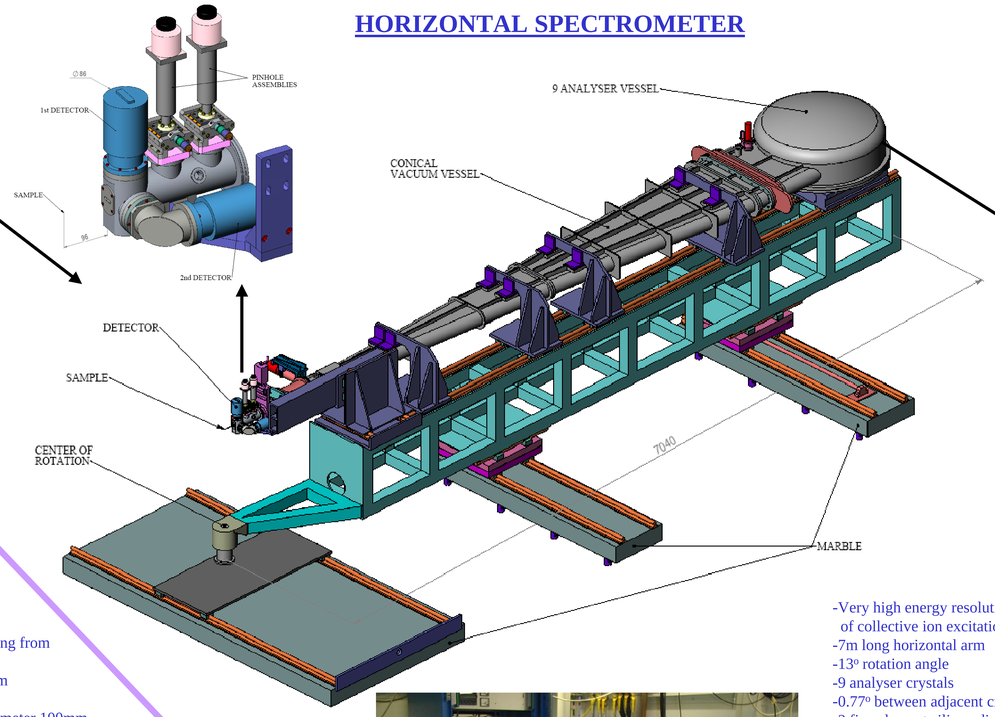


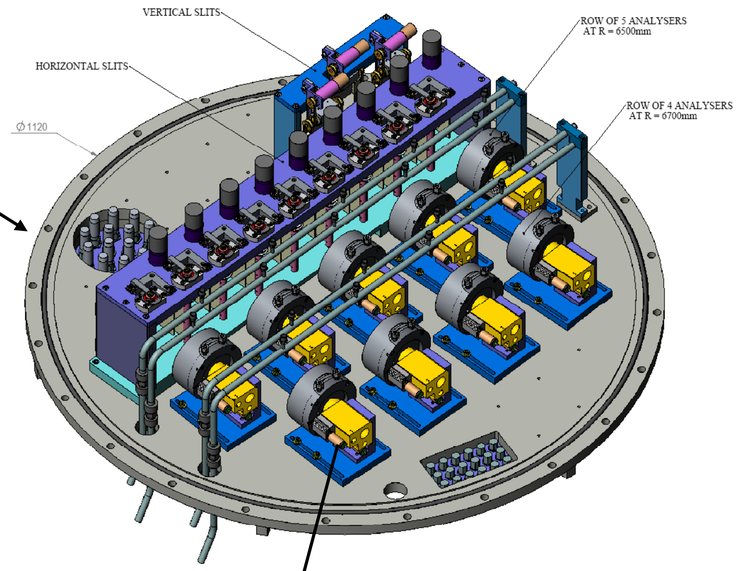
General Layout of ESRF Beamline ID16



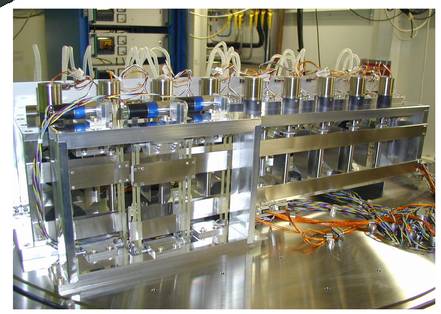
Optical Schematic of Beamline ID16

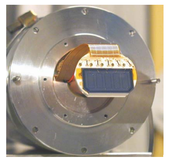
HORIZONTAL SPECTROMETER

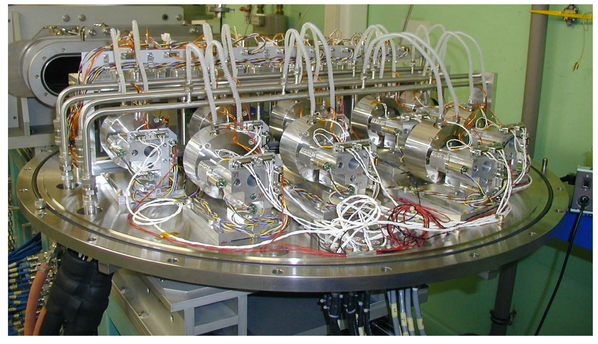




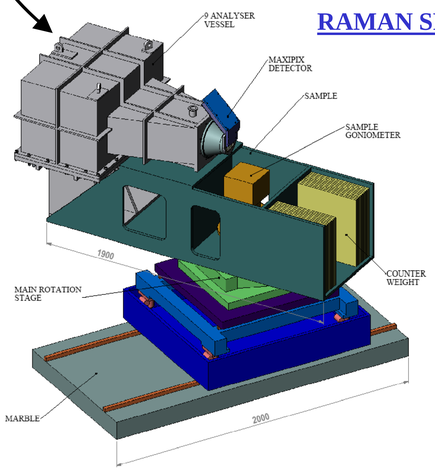
-Very high energy resolution inelastic x-ray scattering of collective ion excitations in condensed matter
-7m long horizontal arm
-13º rotation angle
-9 analyser crystals
-0.77º between adjacent crystals
-2 five element silicon diode detectors
-9 spectra obtained simultaneously



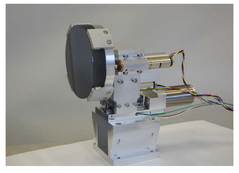


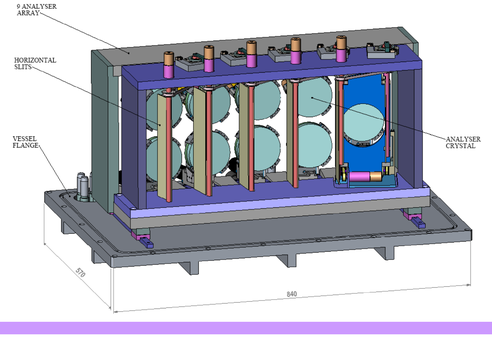


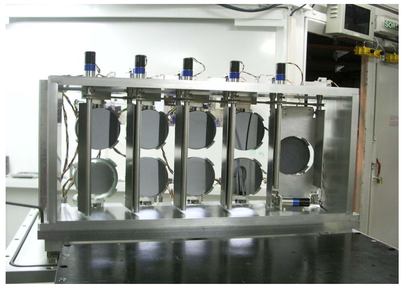
RAMAN SPECTROMETER



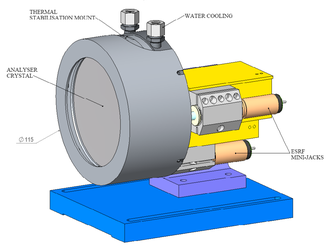
-Inelastic x-ray scattering from electronic excitations
-1m long horizontal arm
-150º rotation angle
-9 analyser crystals diameter 100mm
-6.84º between adjacent crystals
-1 MaxiPix silicon diode detector
-9 spectra obtained simultaneously

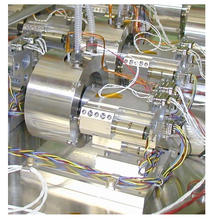




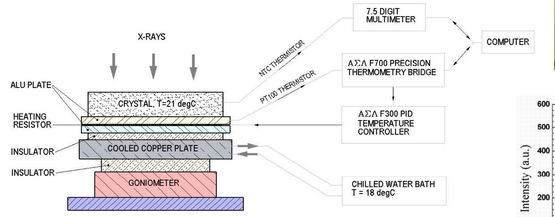
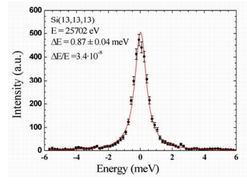


Crystal Assembly & Temperature Stabilisation





-Custom made compact 2 axis goniometer
-Spherical “diced” crystal, diameter 100mm
-1 mK temperature stabilisation
-1meV energy resolution at E=25keV



Analyser Crystal Thermal Mount & Temperature Control System