

GILDA: the **Italian** CRG beamline at **the** ESRF



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GILDA is the **Italian** CRG beamline at the European Synchrotron Radiation Facility. Operative since 1994 it provides a high energy and high intensity beam for studies based on X-ray Absorption **Spectroscopy (XAS)** and powder diffraction (**XRD**). The instrumentation for X-ray Absorption Spectroscopy is **particularly suited for studies of highly diluted systems** and surfaces.

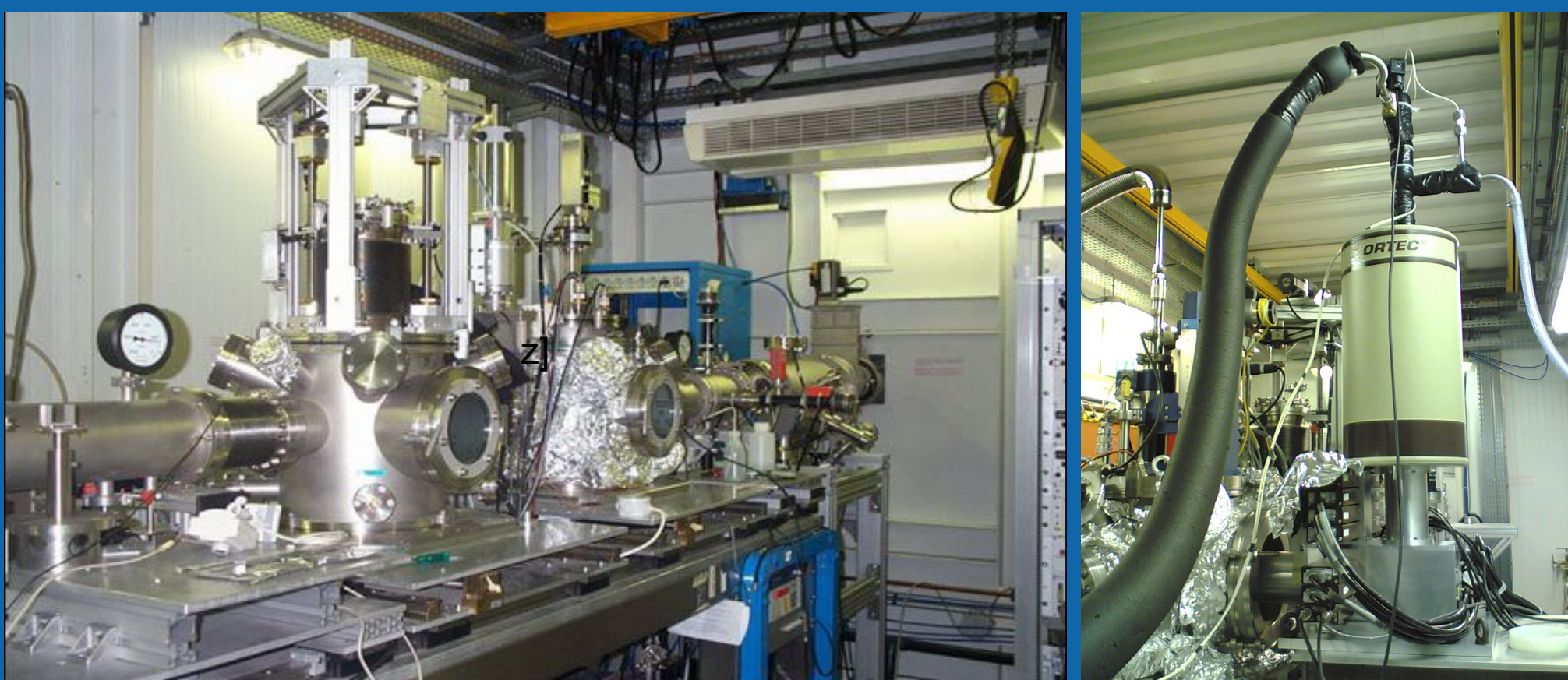
Introduction

GILDA is a beamline using a Bending Magnet (BM08) of the ESRF source. Operative since 1994 provides a beam at high energy and intensity particularly suited for studies on diluted samples and surfaces. The beamline is active in a variety of scientific fields **such as** Materials Science, Physics, Chemistry, **Earth Science** and **Environment**, **Cultural Heritage**, **Life Science** and **Medicine**.

Beamline optics

The optics of GILDA consist in a sagittally focusing monochromator **coupled** with a collimating first mirror and a vertically focusing second mirror. **The beamline** is operative **in the 6–90 keV energy range** with a typical flux of 10^{10} – 10^{11} ph/s and beam dimensions from 2×2 to 0.2×0.2 mm².

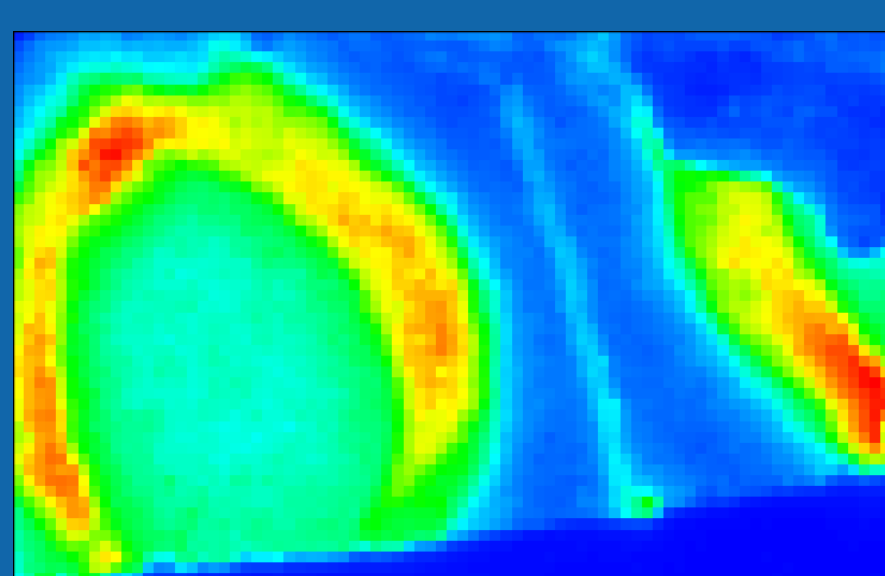
The XAS facility



The facility for XAS measurements consists in a bench with two experimental chambers. Ion chambers and 2 HP-Ge diode arrays are available as detectors. Ancillary equipment for sample environment **includes** a LHe/LN₂ cryostat, a cell for solid–gas reactions, a high temperature oven.

2D-mapping

In case of heterogeneous or patterned samples the beam size can be focused down to $200 \mu\text{m} \times 200 \mu\text{m}$ and 2D x-ray fluorescence maps of the sample surface can be easily collected to identify specific elements and/or select the area to analyze.

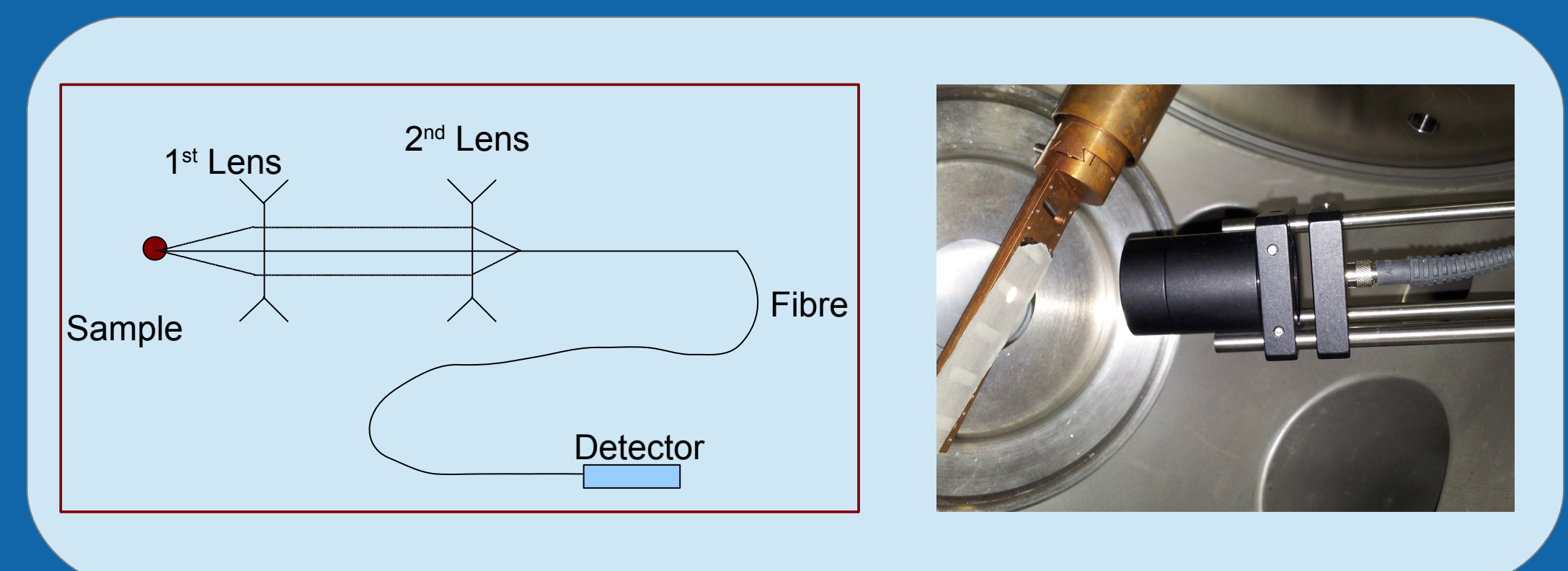


sampled zone 8×5 cm²

Cu–K α map of a fragment of renaissance italian ceramic (lateral size about 20mm). **Sample provided by L. Cartechini (CNR, Perugia)**

The XEOL apparatus

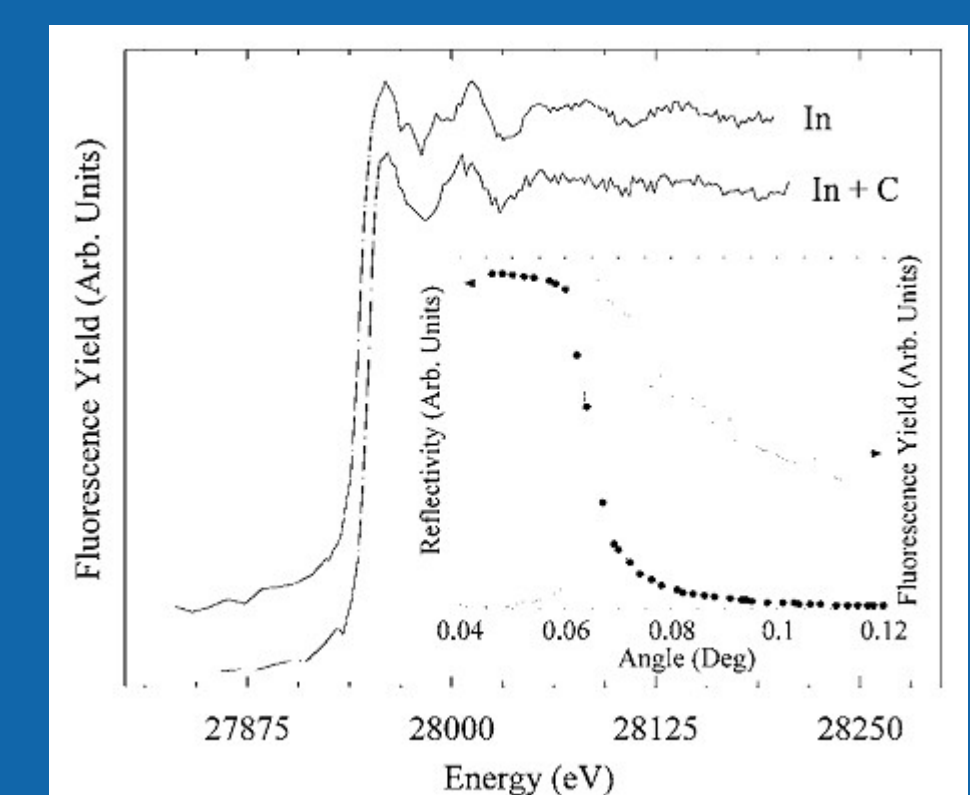
X-ray excited optical luminescence (XEOL) data can be collected with a dedicated instrument.



The light emitted by the sample is collected by two lenses and sent to the detector via an optic fibre. The detector consists in a Photo Multiplier Tube (PMT) with a photocathode sensitive in the 300–650nm **region**.

The RefLEXAFS chamber

A vacuum chamber containing a sample manipulator for EXAFS experiments **in total reflection mode (RefLEXAFS)**. The chamber can be coupled to a multielement Ge detector for measurements on highly diluted samples (limit dilution 10^{13} at/cm²)



5×10^{13} In/cm² in Silicon measured at the In-K edge in RefLEXAFS. From F.d'Acapito et al. APL 88 212102

Conclusion

GILDA is **regularly** open to users from **both** the Italian and international **communities**. **Four** calls per year (1st March, May Sept, Nov) are issued to submit the experimental proposals. More infos are available at the beamline web page

<http://www.esrf.fr/UsersAndScience/Experiments/CRG/BM08/>

Or contacting the scientist in charge:

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