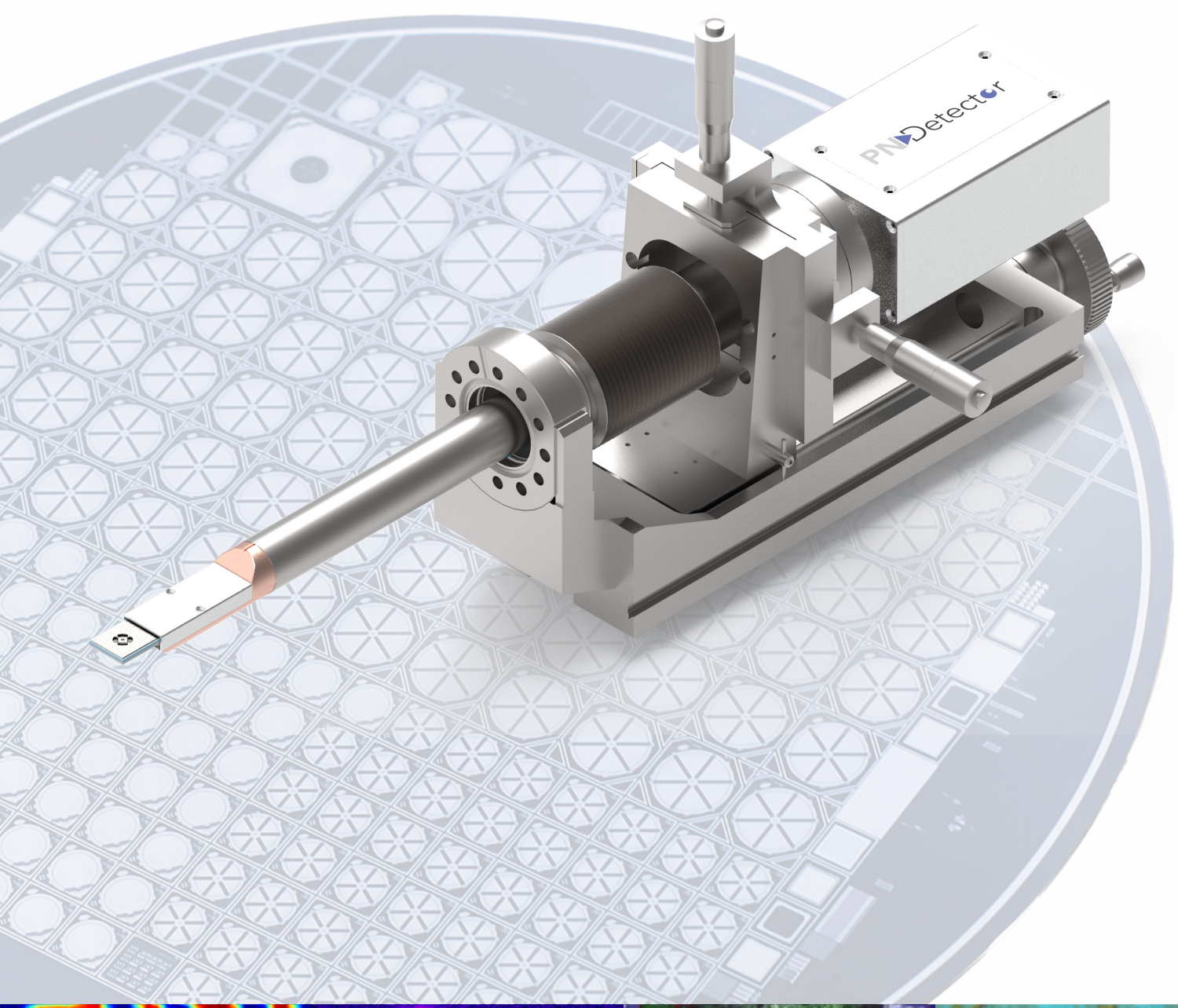
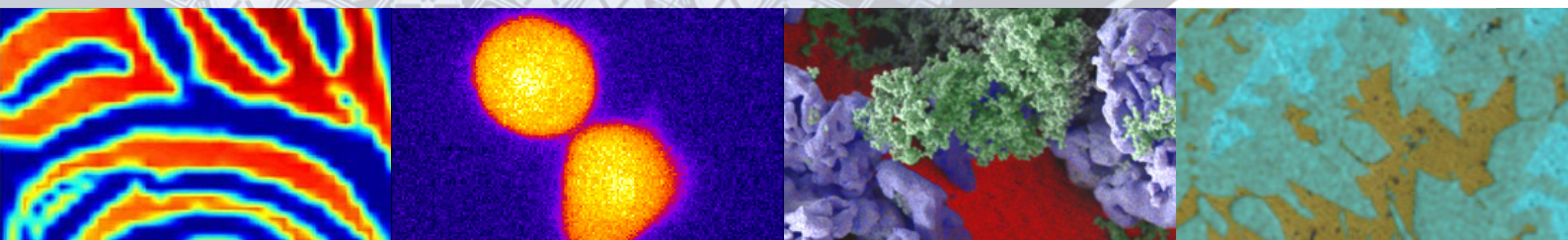
PNDetector

THE ROCOCO DETECTOR SYSTEM

ULTRA HIGH SOLID ANGLE SILICON DRIFT DETECTOR FOR XRF, XRD AND EDX

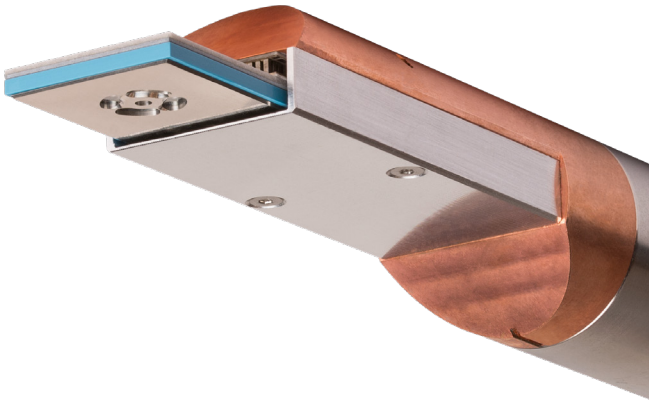




PND's Rococo Annular Rococo Detector

Silicon Drift Detectors (SDD) are commonly used for X-ray spectroscopy in XRF, XRD and EDX applications. Multiple detectors are often a simple but space consuming way to increase the solid angle coverage and thus the overall count rate. A smarter high solid angle solution is offered by the Rococo Preamplifier Module which is a SDD based system for X-ray spectroscopy featuring our annular four channel Rococo SDD.

The unique detector geometry allows it to be placed in very close proximity to the sample. This results in a huge solid angle coverage and a high take-off angle. The compact preamplifier and supply electronics ensure the best energy resolution of 126 eV FWHM @ Mn-K_α and easy integration into any system for high count rates up to 4 Mcps.



Choose the detector that fits your need

Rococo 2

- active area of 4 x 15 mm²
- central hole of 1.8 mm
- 1.1 sr solid angle coverage
- typ. 126 eV FWHM @ Mn-K_α (10 kcps)
- typ. 128 eV FWHM @ Mn-K_α (100 kcps)
- P/B ratio of 15 000

Rococo 3

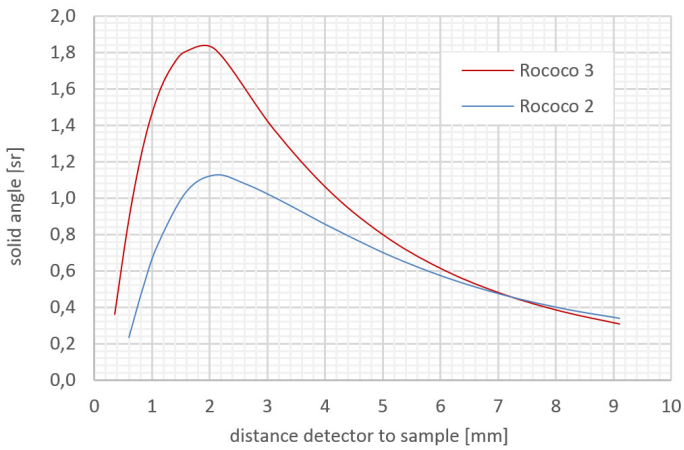
- active area of 4 x 20 mm²
- central hole of 1 mm
- 1.8 sr solid angle coverage
- typ. 126 eV FWHM @ Mn-K_α (10 kcps)
- typ. 128 eV FWHM @ Mn-K_α (100 kcps)
- P/B ratio of 15 000

Ultra large solid angle

With its four annular arranged cells, the Rococo detector achieves a very high solid angle of up to 1.8 sr. This is made possible by the central hole which allows the detector to be brought in very close proximity to the sample without obstructing the primary beam. In the advertized configuration the Rococo detector is to be used in vacuum.

A Beryllium foil shields the detector from electrons or optical light. Windowless configurations or other foil materials for light element analysis are available on request.

The graphic shows a simulation of the solid angle in relation to detector-sample-distance. For both detectors the collimator was optimized for a sample distance of 2 mm which corresponds to a working distance of est. 6 mm. Even for a sample distance of up to 4 mm the detector still covers a large solid angle of about 1 sr.



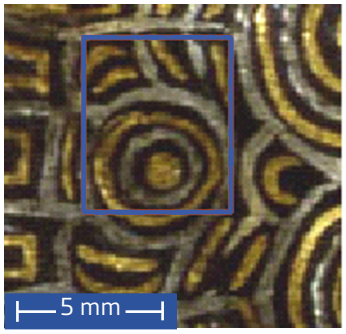
A vast variety of applications

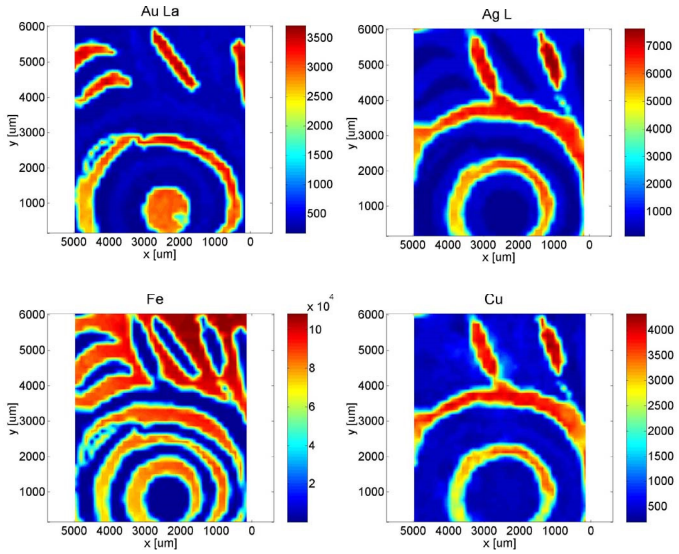
Whenever there is a need for fast measurements combined with low signal intensities, the Rococo detector system gives a considerable advantage over commonly used detectors. With its large solid angle it produces up to 100 times more signal compared to conventional Silicon Drift Detectors. This makes it an ideal candidate for applications which demand for large throughput or high statistics such as elemental mappings. In life science, where the fluorescence yield is very low because of the very thin biological samples, the Rococo detector is able to capture enough signal for accurate results in reasonable measurement times.

Sample applications are:

- Synchrotron applications such as Cryo XRF on biological samples
- Proton-induced X-ray emission (PIXE) and micro-PIXE analysis
- Back-Reflection Energy-Dispersive X-Ray Diffraction (EDXRD)
- Energy-Dispersive X-Ray Spectroscopy (EDX) in Low Voltage Electron Mircoscopy (LVSEM) or TEM

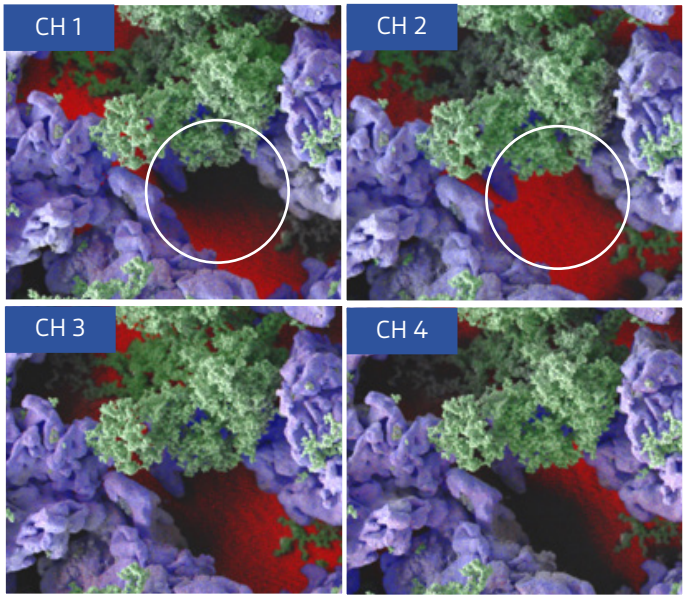
Fast XRF elemental mappings





XRF mapping of the inlaid work of a lombard buckle from the seventh century found in Tezzo d' Adda (nothern italy). The scanned area was 5 x 6 mm with 250 µm pitch. Acquisition time per pixel was 1 s leading to a total scan time of 8 minutes.
(A. Longoni et al., X-Ray Spectrom. 2005, 34: 439-445)

SEM-EDX analysis with highest sensitivity

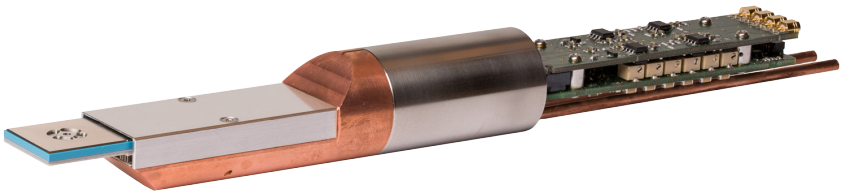


SEM-EDX elemental mapping of iron- and kaolinite-powder on carbon. The large vield of view of the 4 individual channels gives an almost shadowless image as indicated by the white circles.
Large 1024 x 768 pixel mapping acquired at low beam current of only 400 pA in only 5 minutes.

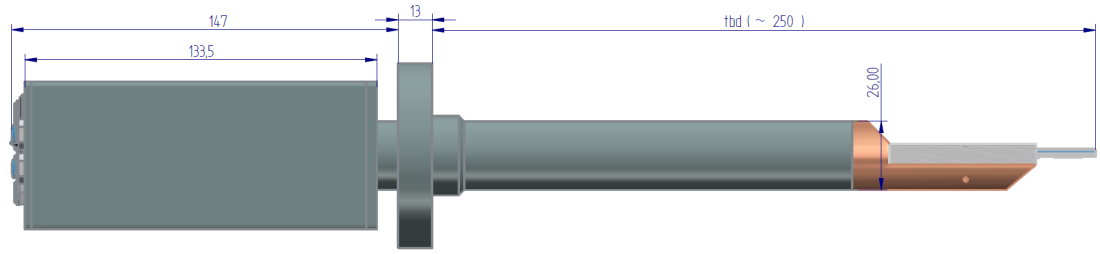
Easy Operation in Any System – Even in Ambience with Optical Light

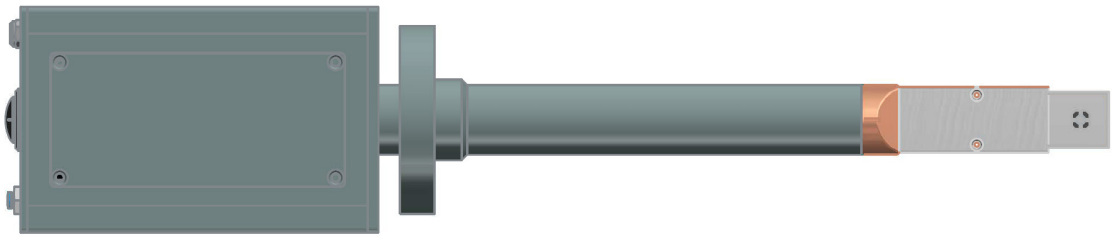
The detector is mounted on a ∅ 26 mm tube and can be retracted through a linear feedthrough. The very compact 4-channel preamplifier electronics are inside this tube and positioned very closely to the detector, directly behind the vacuum interface. This, together with the water cooling connection, ensures stable operation without disturbances from the outside.

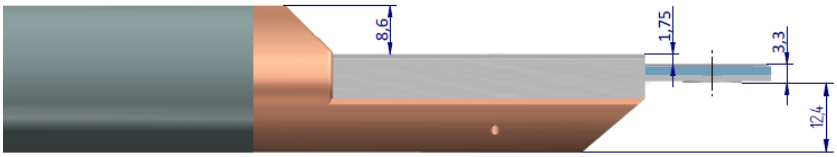
A new light-tight version of the detector has been developed which enables high resolution spectroscopy in ambience with optical light, even with direct sample illumination and gives new possibilities for simultaneous optical and spectral investigations.



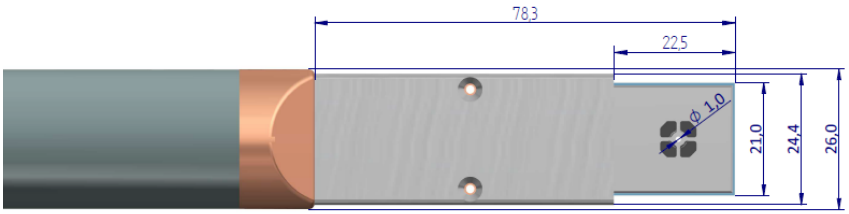
Mechanical dimensions







Main dimensions of the Rococo Detector System including the SDD detector head, tube with integrated 4-channel preamplifier, vacuum flange and bias voltage supply unit. The length of the tube and the flange interface are typically customized for different systems and applications. Further modifications can be realized on request.



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