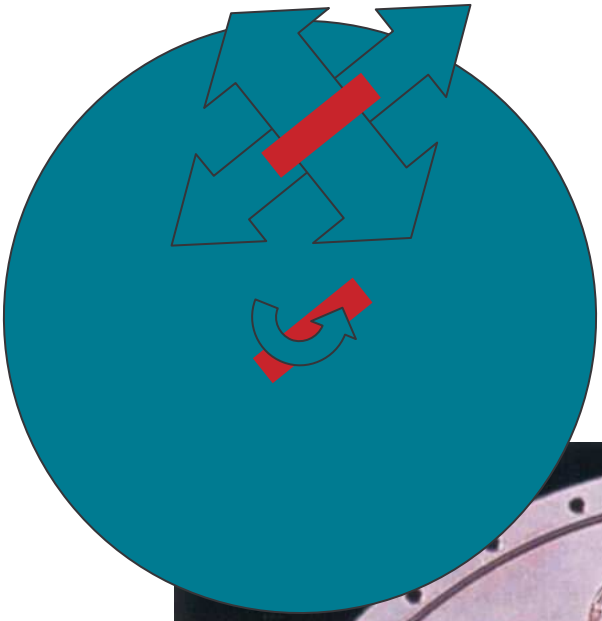
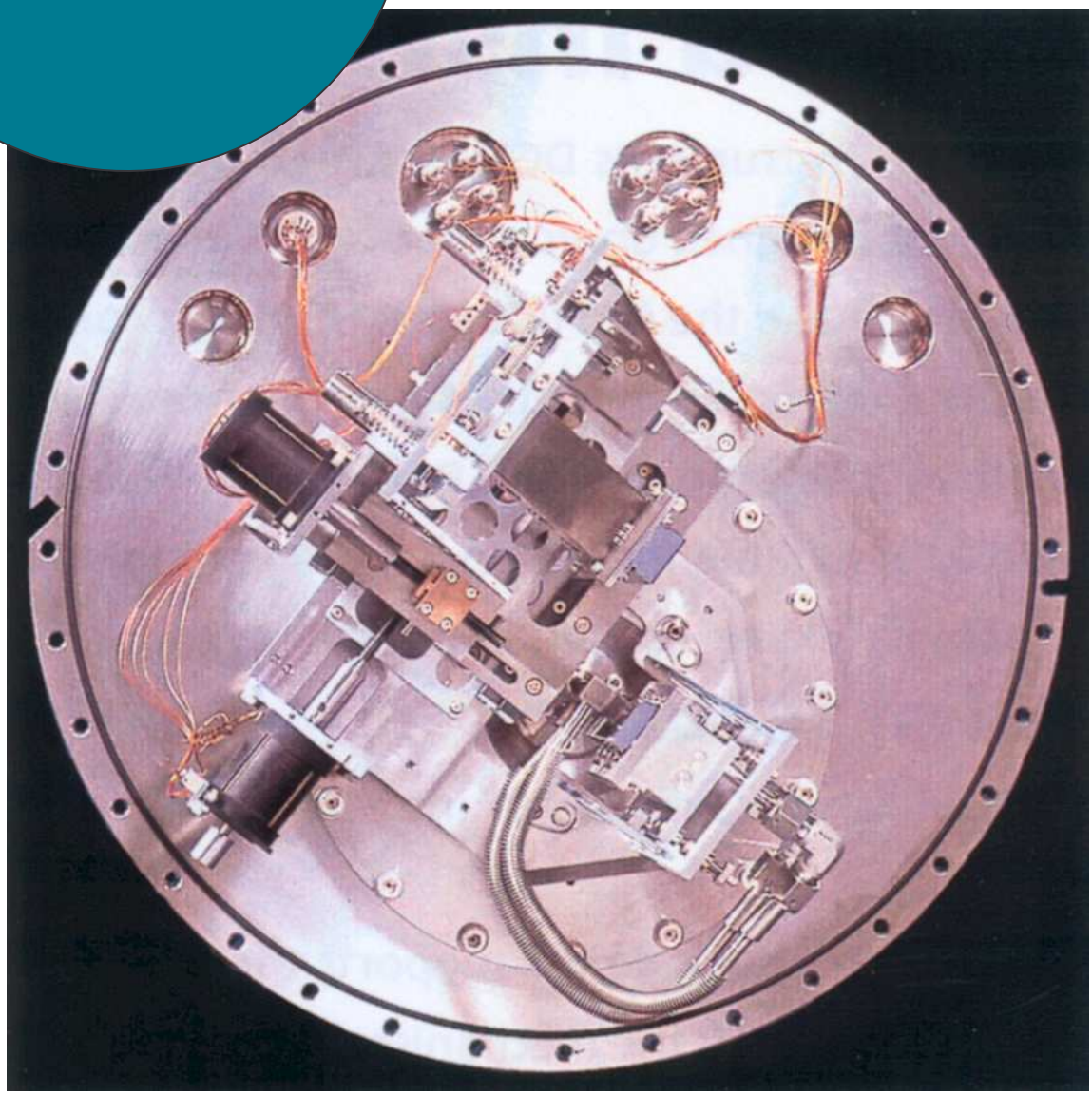
Double crystal monochromator





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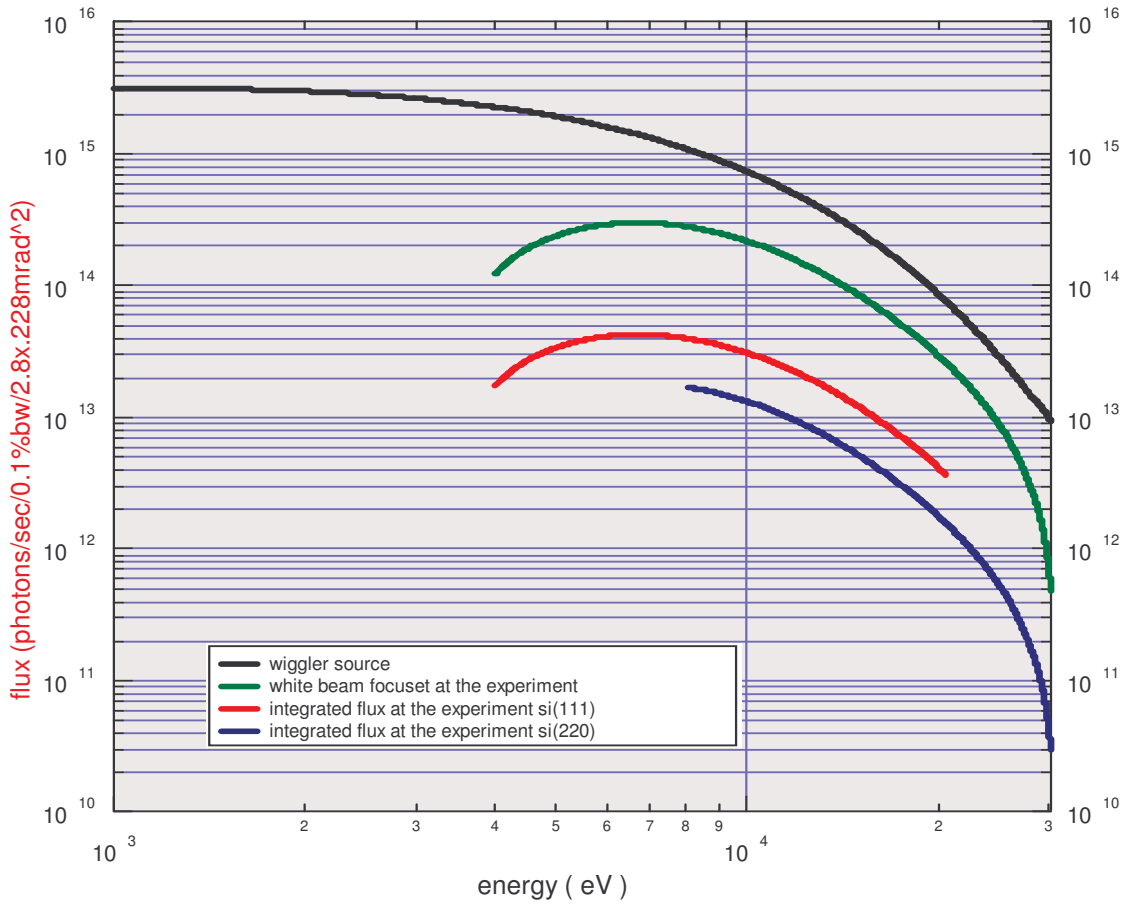
Diffraction 1

57 poles wiggler source at ELETTRA
400mA, 1.6T and 2GeV
total power: 8 kW



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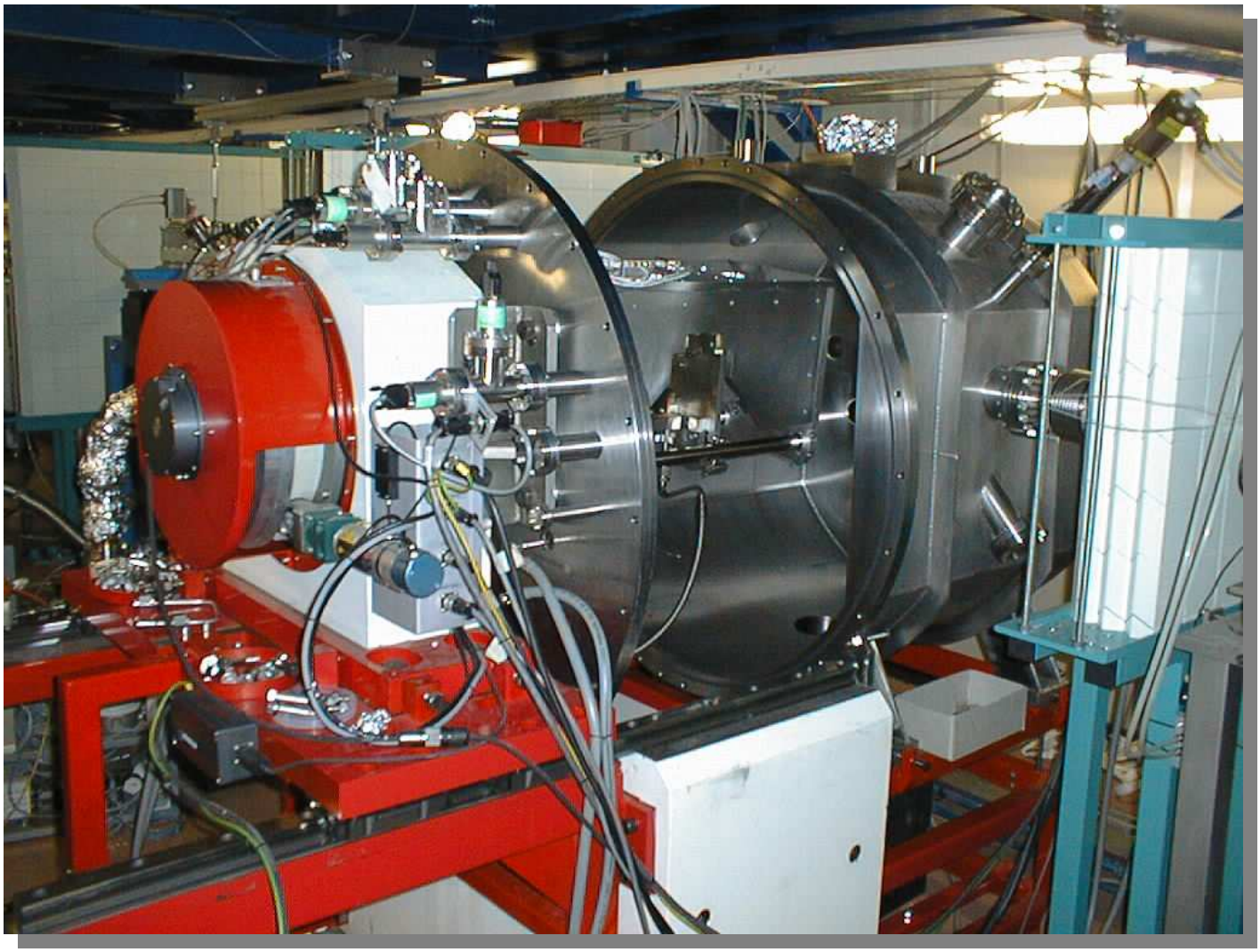
The double crystal monochromator at the **diffraction1** beamline



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Diffraction 1:
first optical element in the beam
Si(111) internally water cooled

total power absorbed 0.5 kW*

* 1.5 x 0.28 mrad^2

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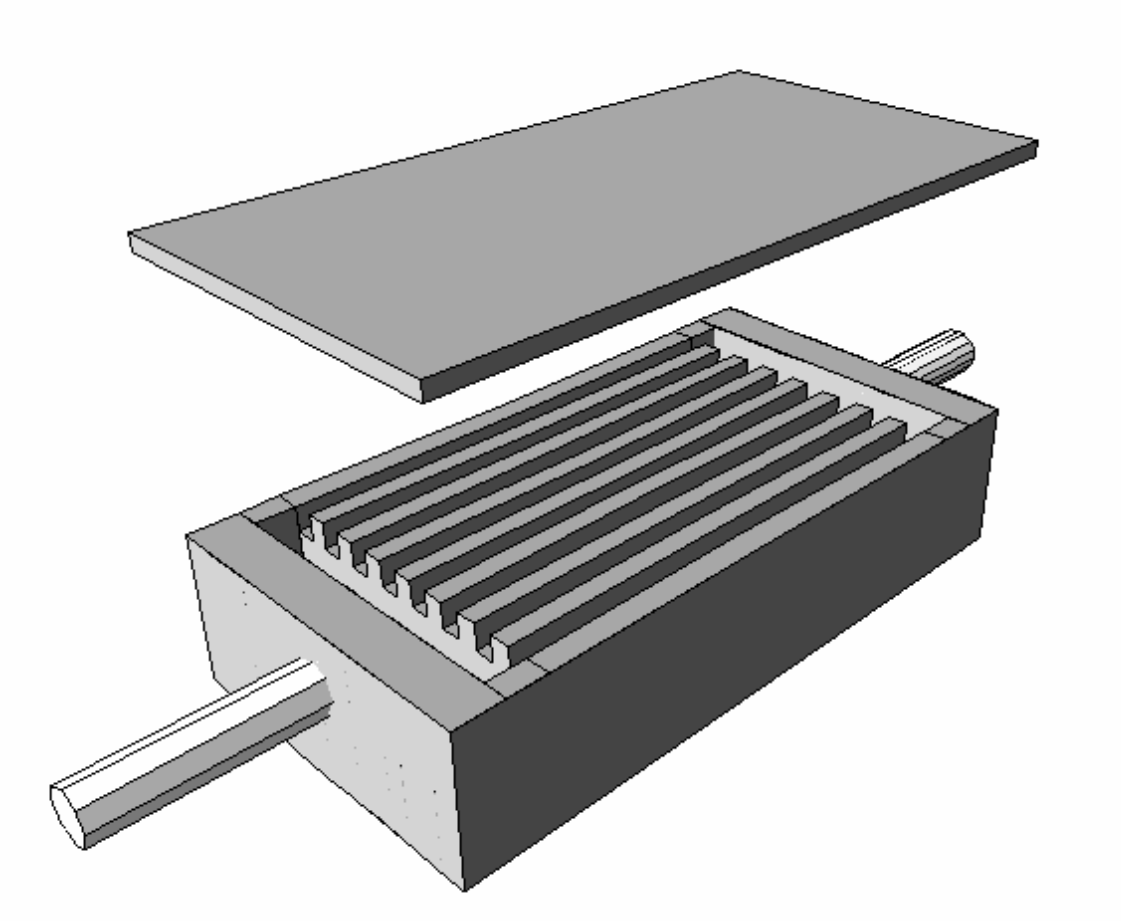
Conceptual design of an internally water cooled crystal



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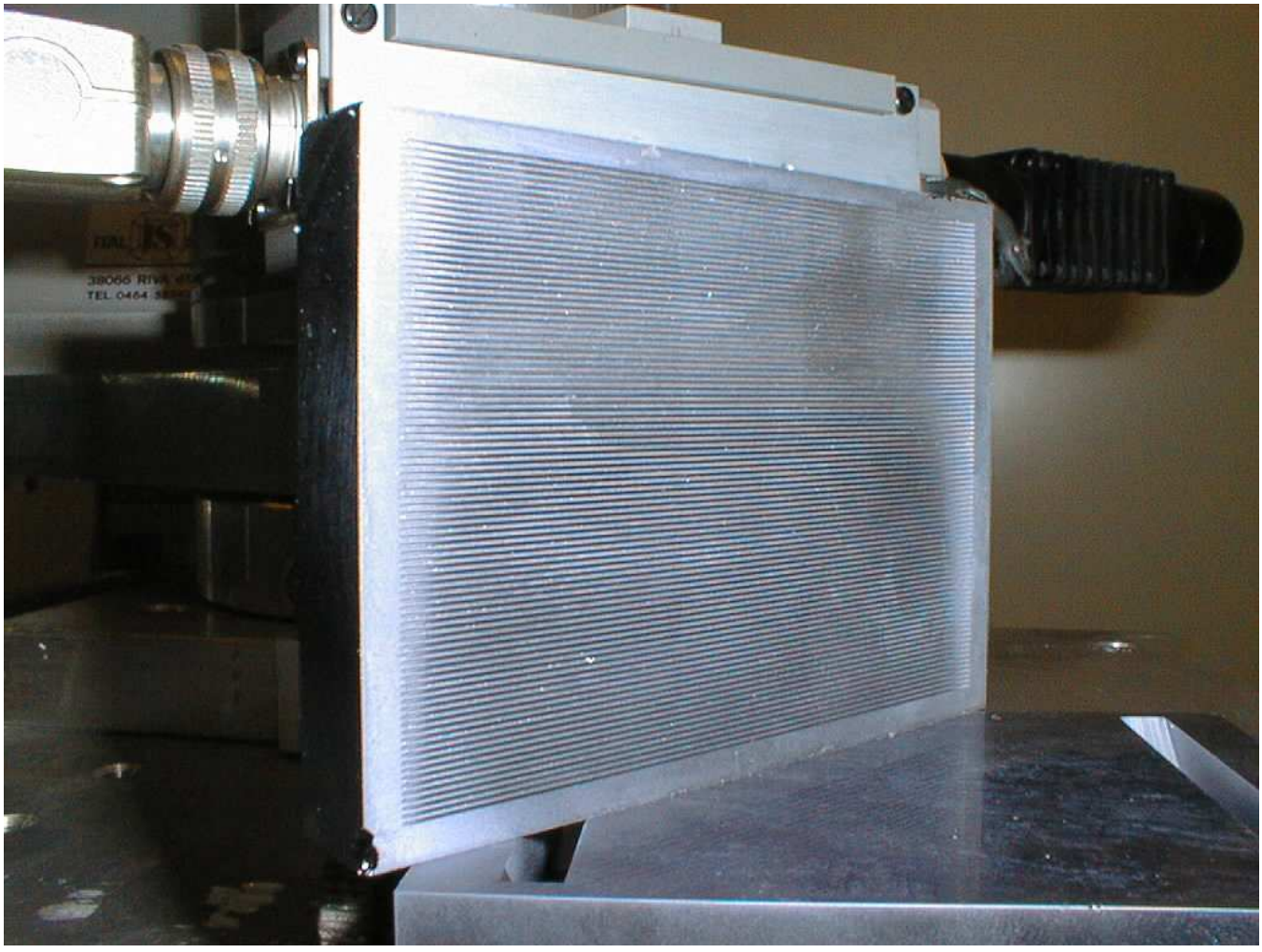
The two Si components before the Si-Si brazing



channels: thickness: 300µm
depth: 2mm

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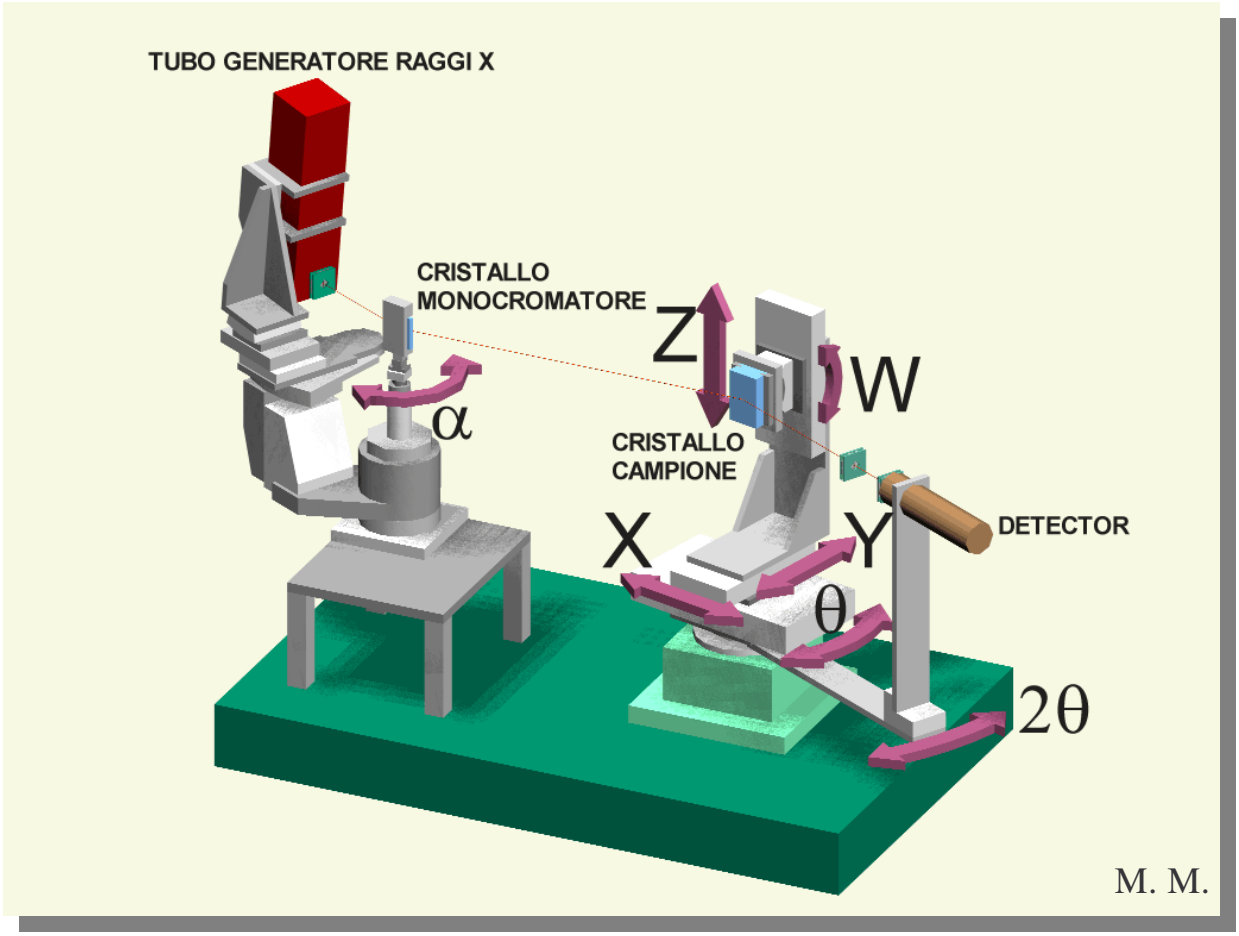
3D picture of the double ϑ-2ϑ equipment



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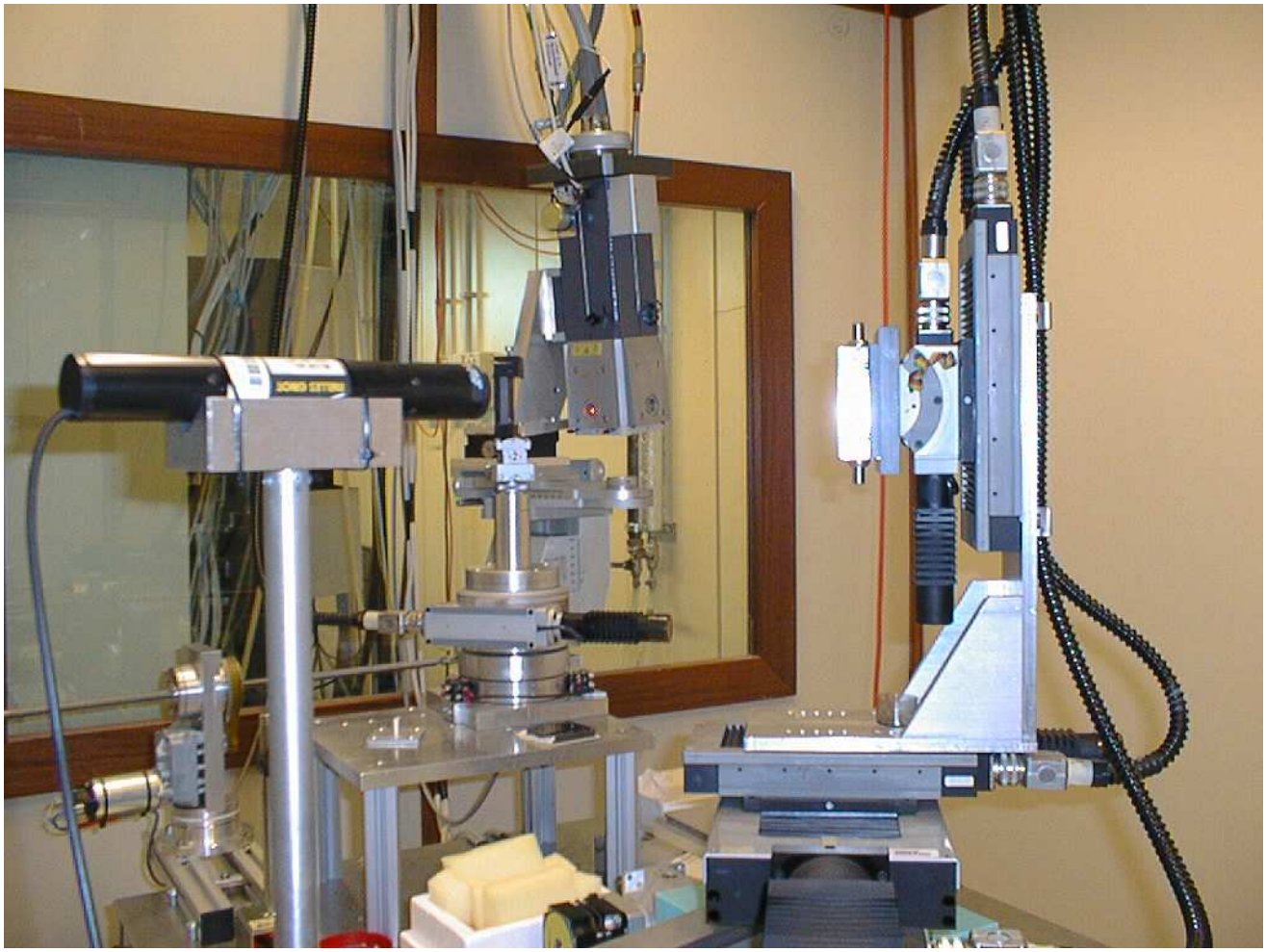
The double ϑ-2ϑ test station at the Hard X-ray Laboratory



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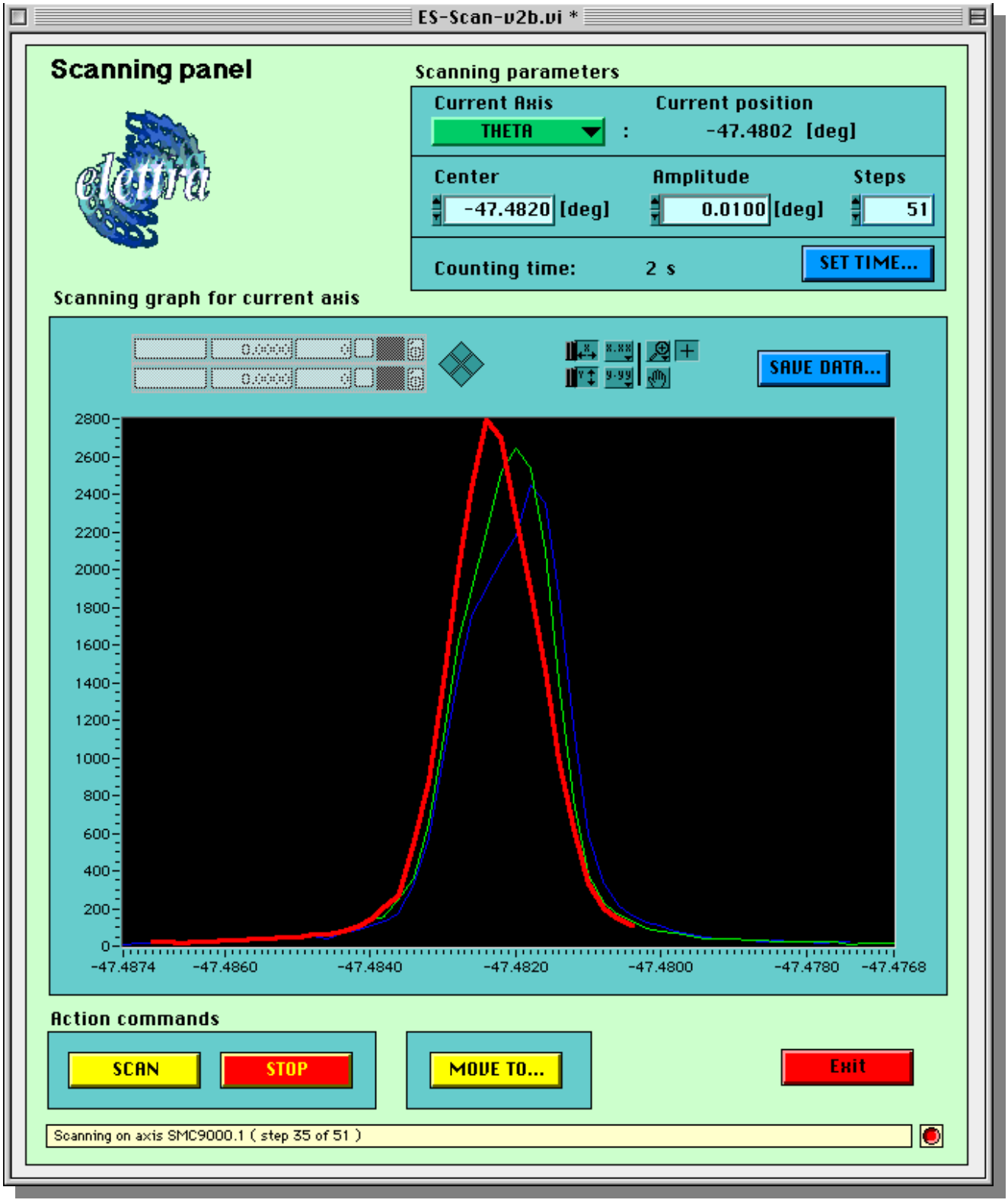

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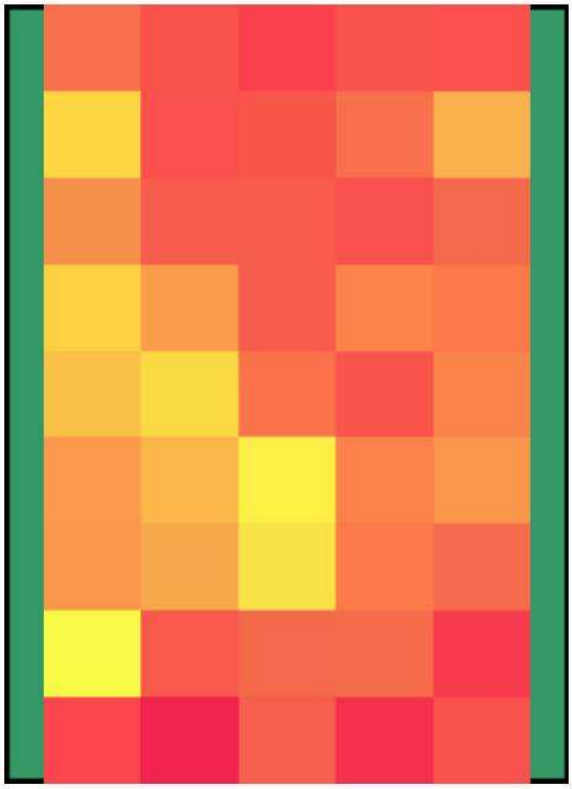
DISTRIBUZIONE DELL'AMPIEZZA DELLE ROCKING-CURVE VALUTATE MEDIANTE DIFFRAZIONE SUI PIANI Si-111



14.1
13.6
13.1
12.6
12.1
11.6
11.1
10.7
10.2
9.7

Valori espressi in secondi di grado

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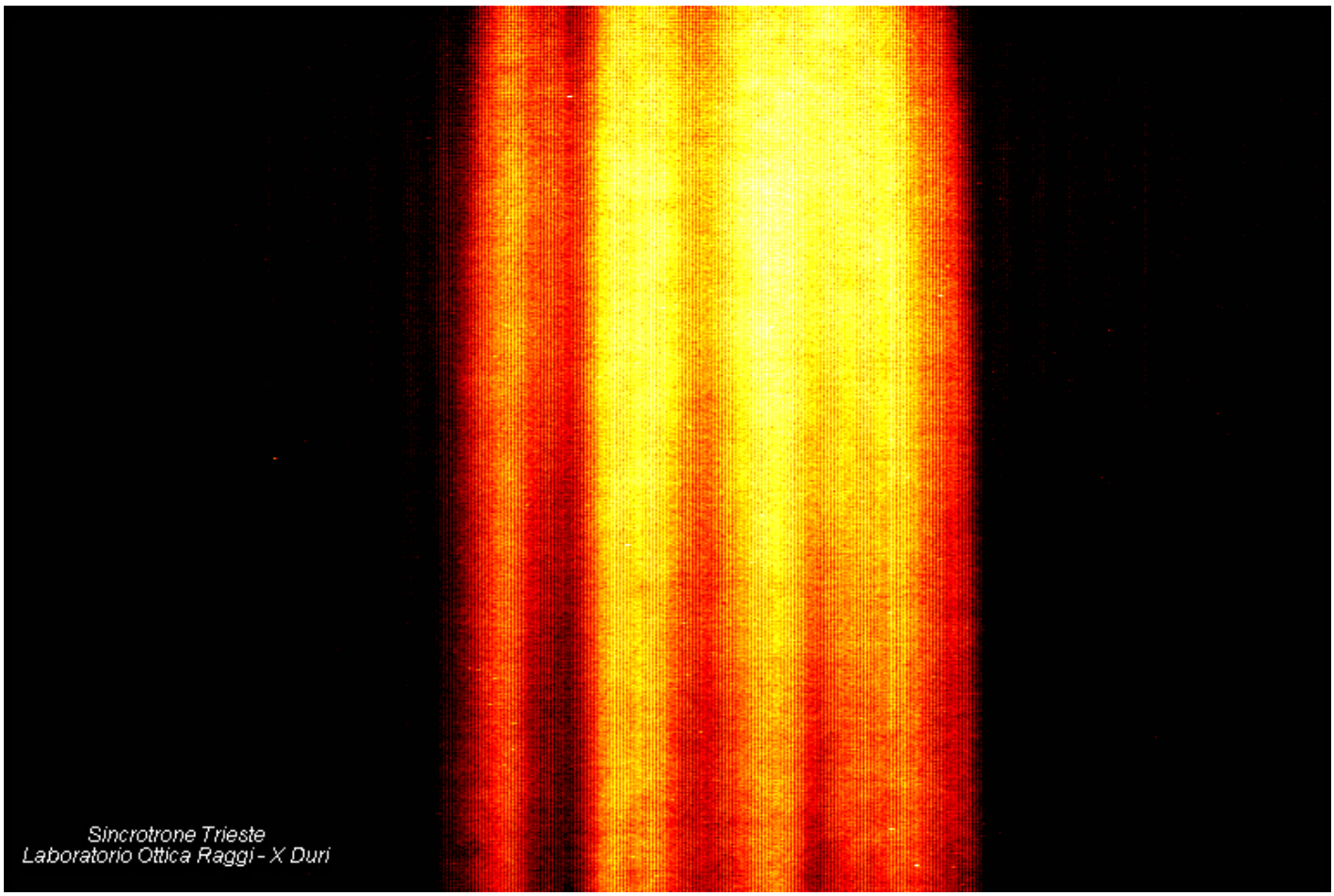
Topography of the internal cooled Si-crystal with channels perpendicular to the scattering plane



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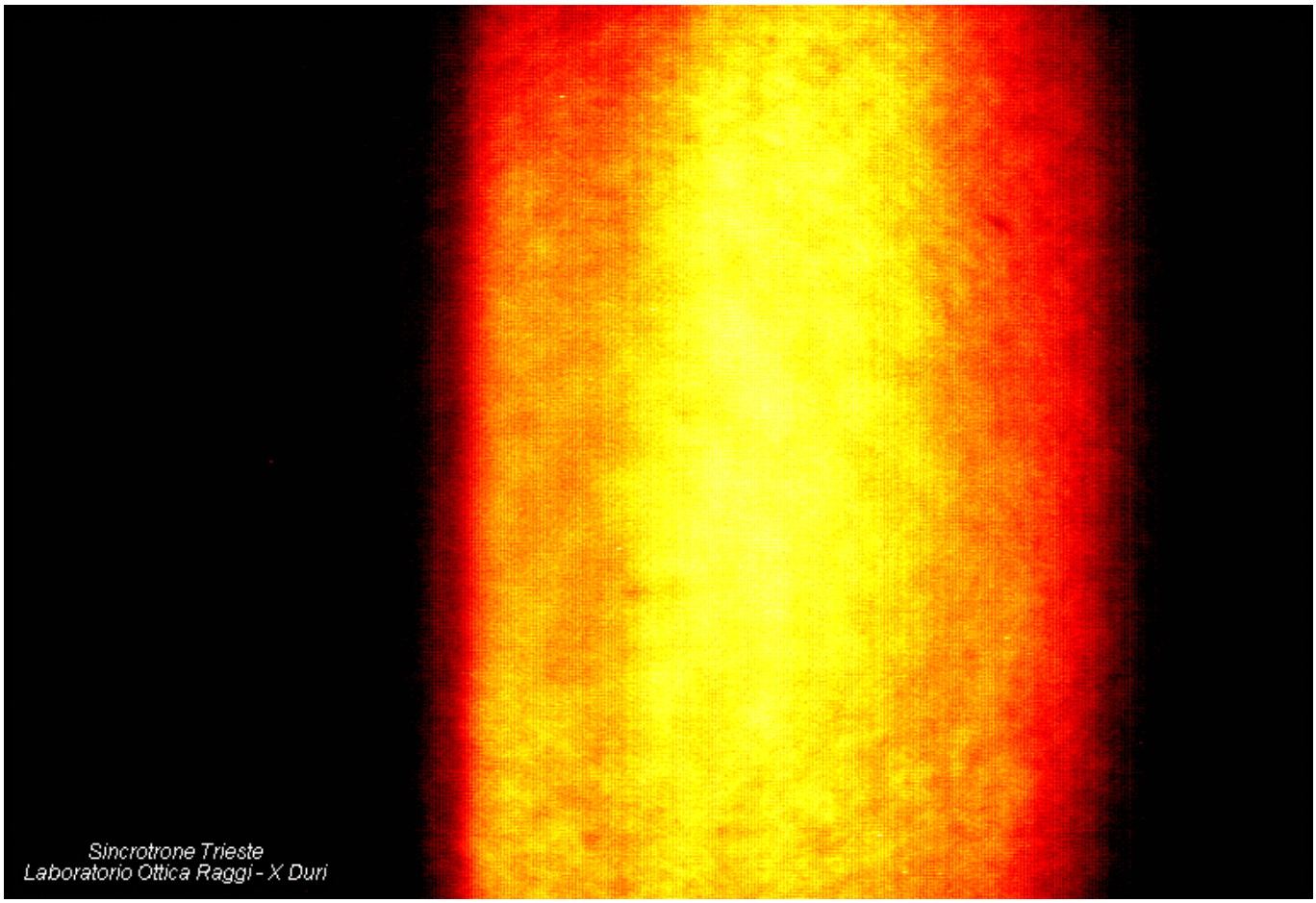
Same topography but with channels in the same direction of the scattering plane



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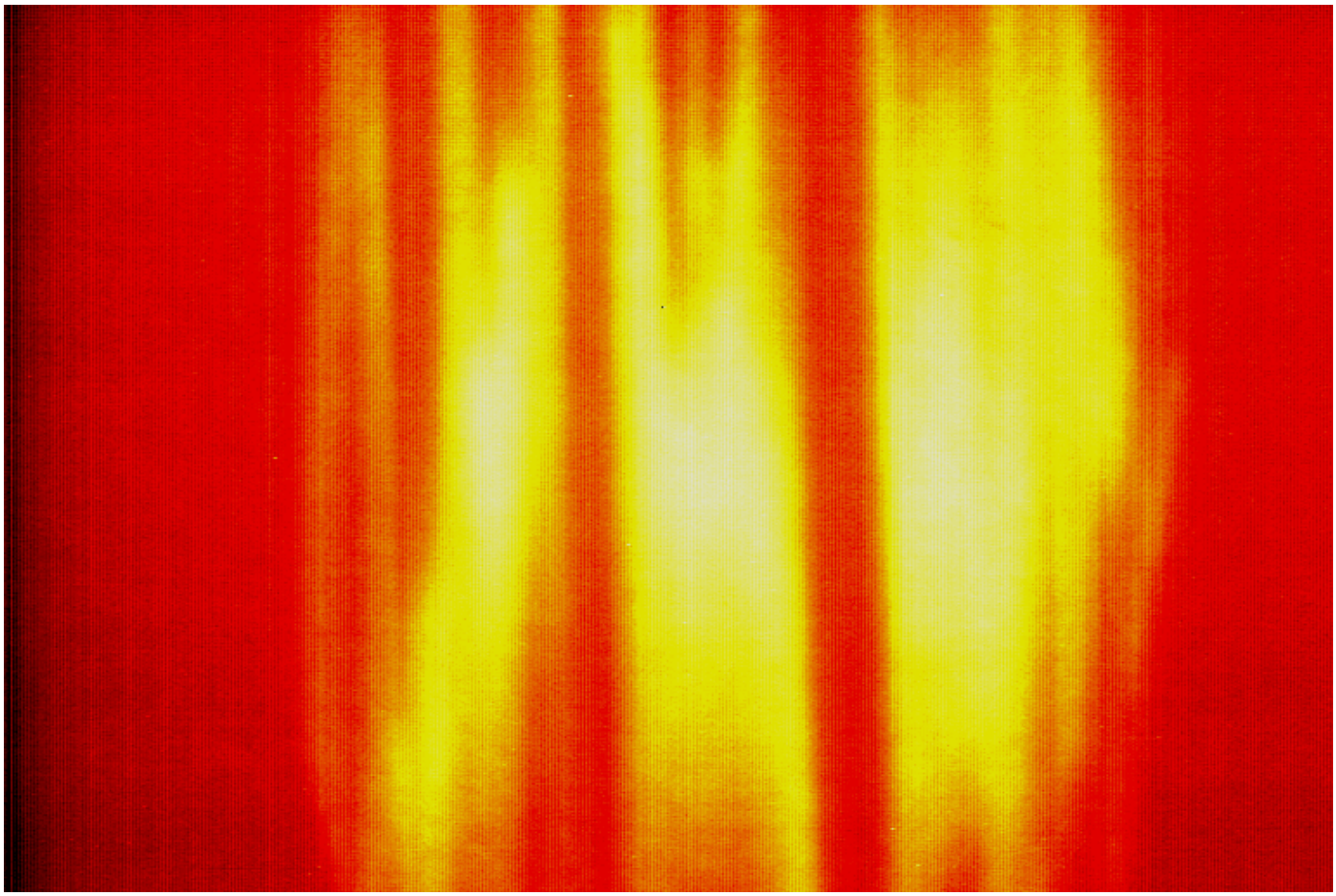
surface of a Si(111) crystal with a evident stressed structure induced by a back-side machining and not removed by chemical hatching



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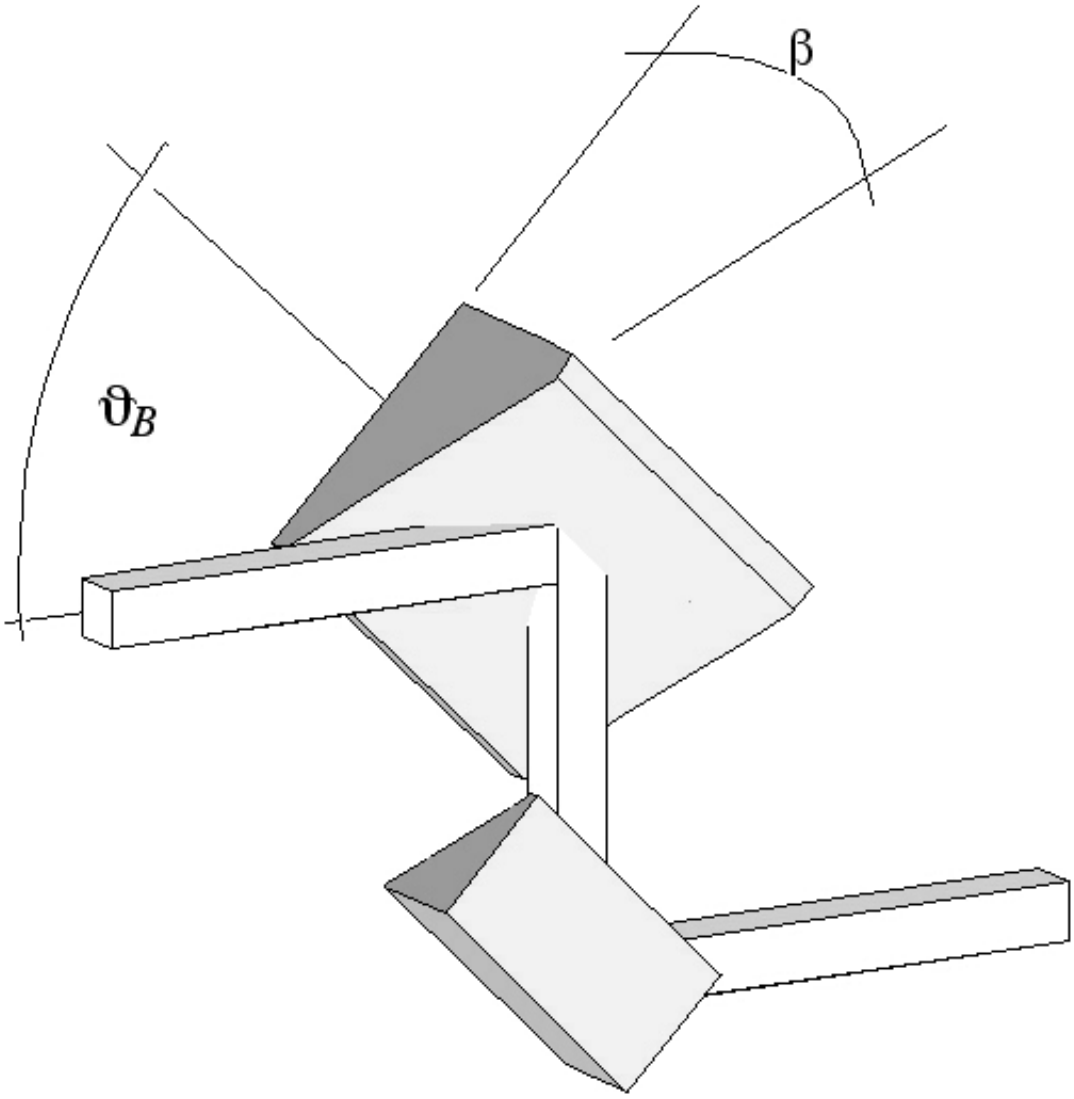
The inclined double crystal monochromator setup to reduce the power density



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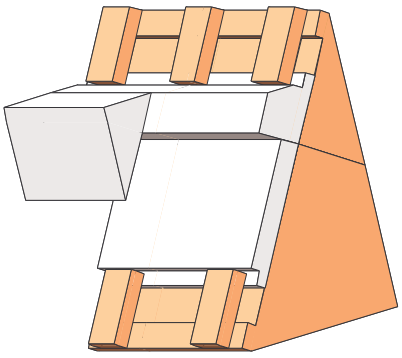
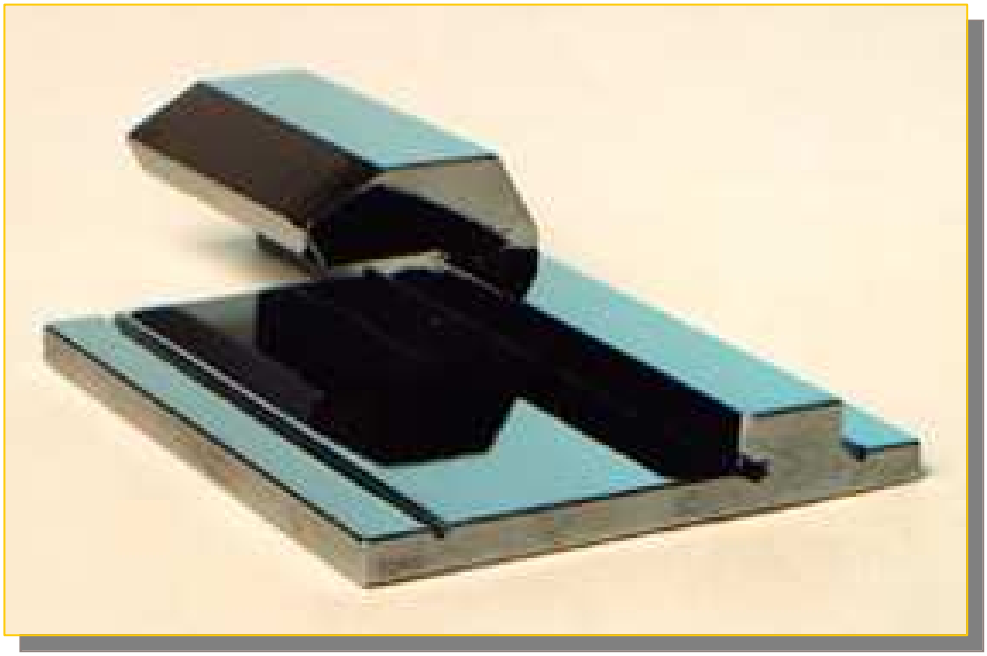
Si(111) inclined channel-cut crystal monochromator designed for the ALOISA beamline.

energy range: 2.8 to 8 KeV
beam dimension: 3x3 mm
source: wiggler-ondulator





E. Busetto et al.: *"The High Energy Monochromator for the ALOISA Beamline"*. Rev. Sci. Instrum. **66** (2), February 1995

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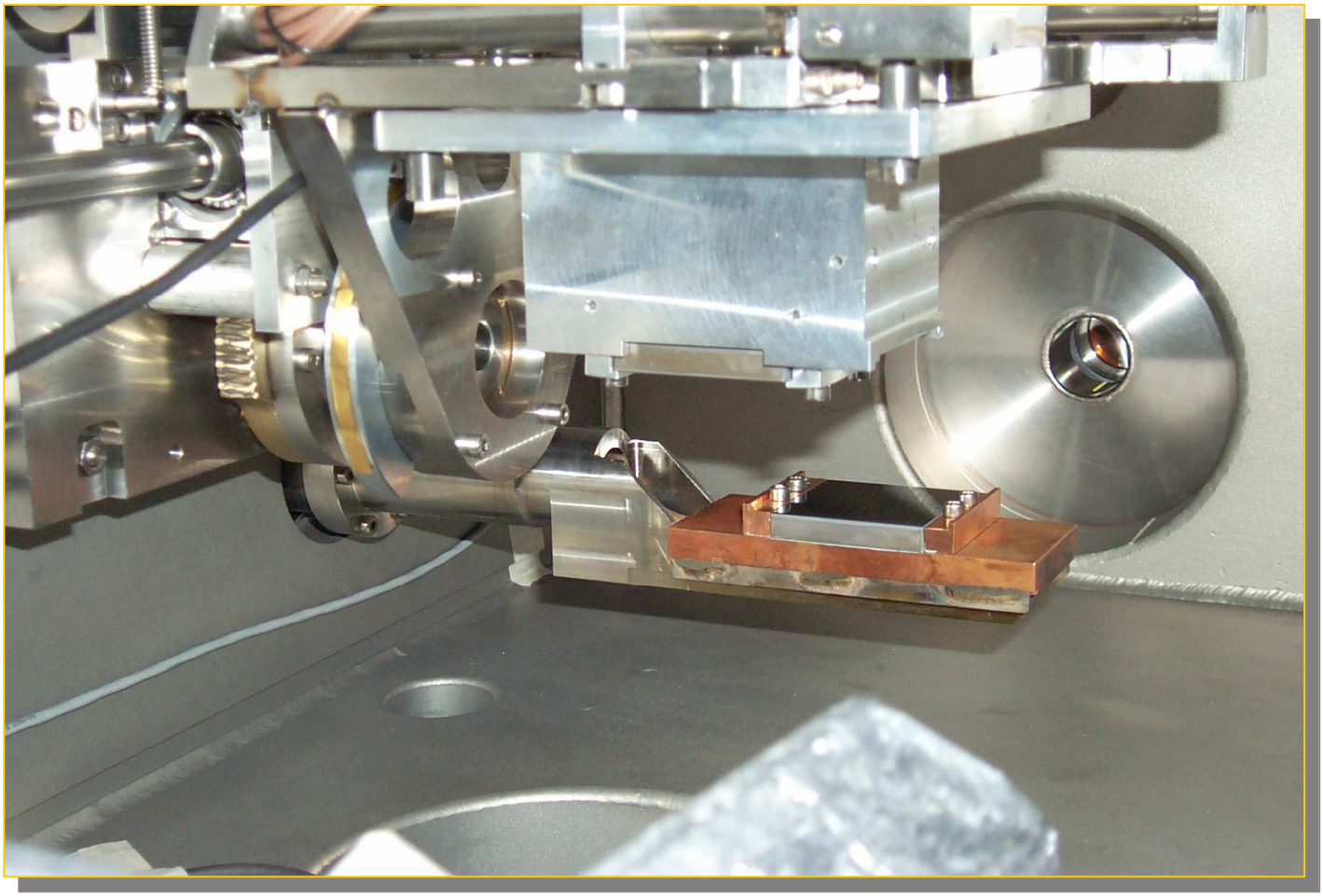
A new prototype of monochromator under test with x-rays



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- Detector for Hard X-rays

- Two large families:

  single counters

  integrators

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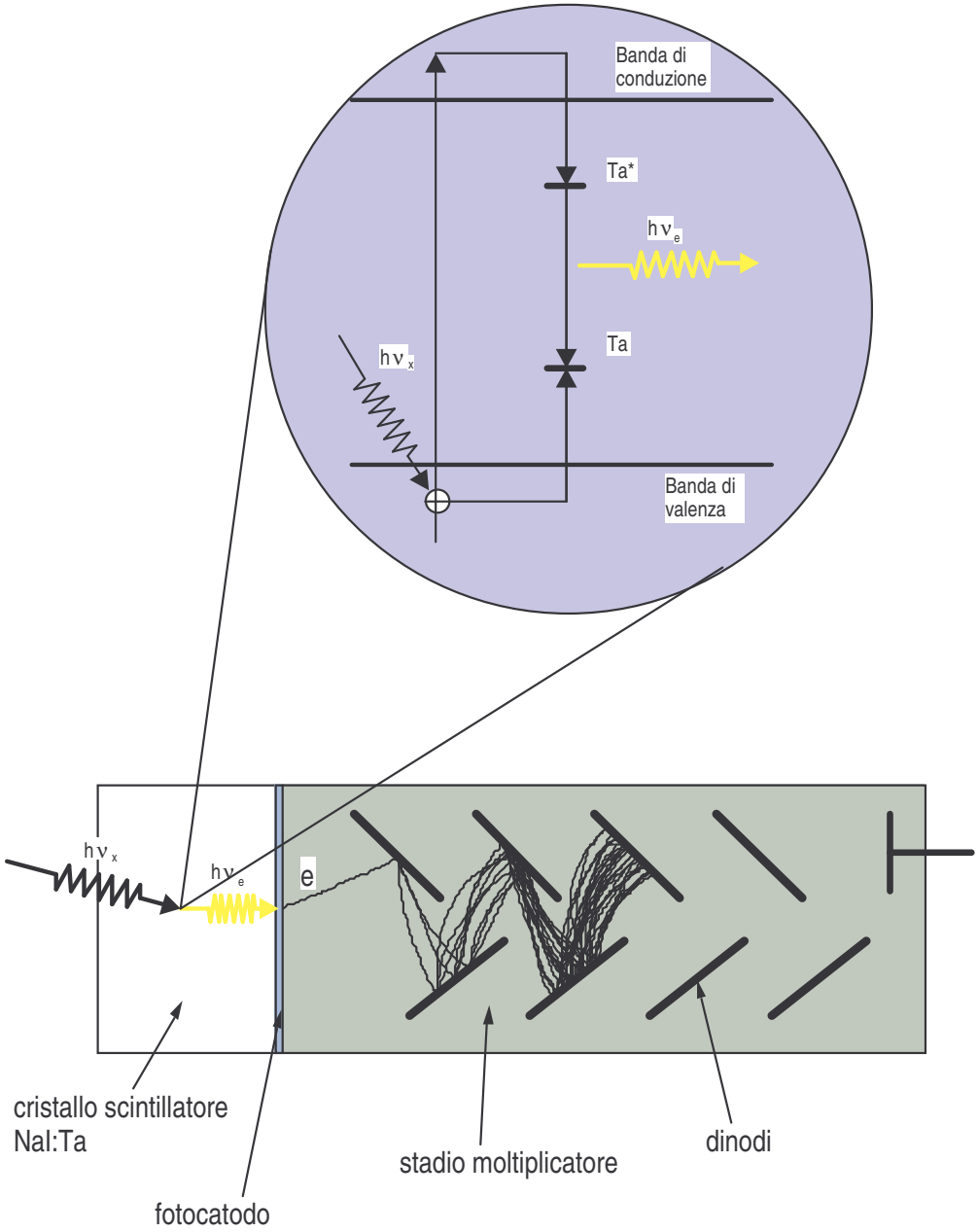
- Single counters :

- These systems allow to collect all the electrons produced by the absorption of an x-ray.
- The mean number of electrons produced during the absorption process is proportional to energy of the single x-ray.

Shintillators

These kind of detectors are the result of the coupling between a doped crystal (i.e. NaI:Ta) and a photo-multiplier tube



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Integrators

- They are systems that integrates the charge. They generally lose the direct correlation between electrons produced and energy of the absorbed photon.
- The signal local intensity has to be proportional to the number of photons absorbed in the same region.

The radiographic film

It is still one of the most used detector.
Due to the photocemical reaction AgBr –> Ag^+ with a density of Ag^+ that is proportional to the absorbed radiation. The developer bath reduces Ag^+ –> Ag with the tipical gray scale we are used to see .

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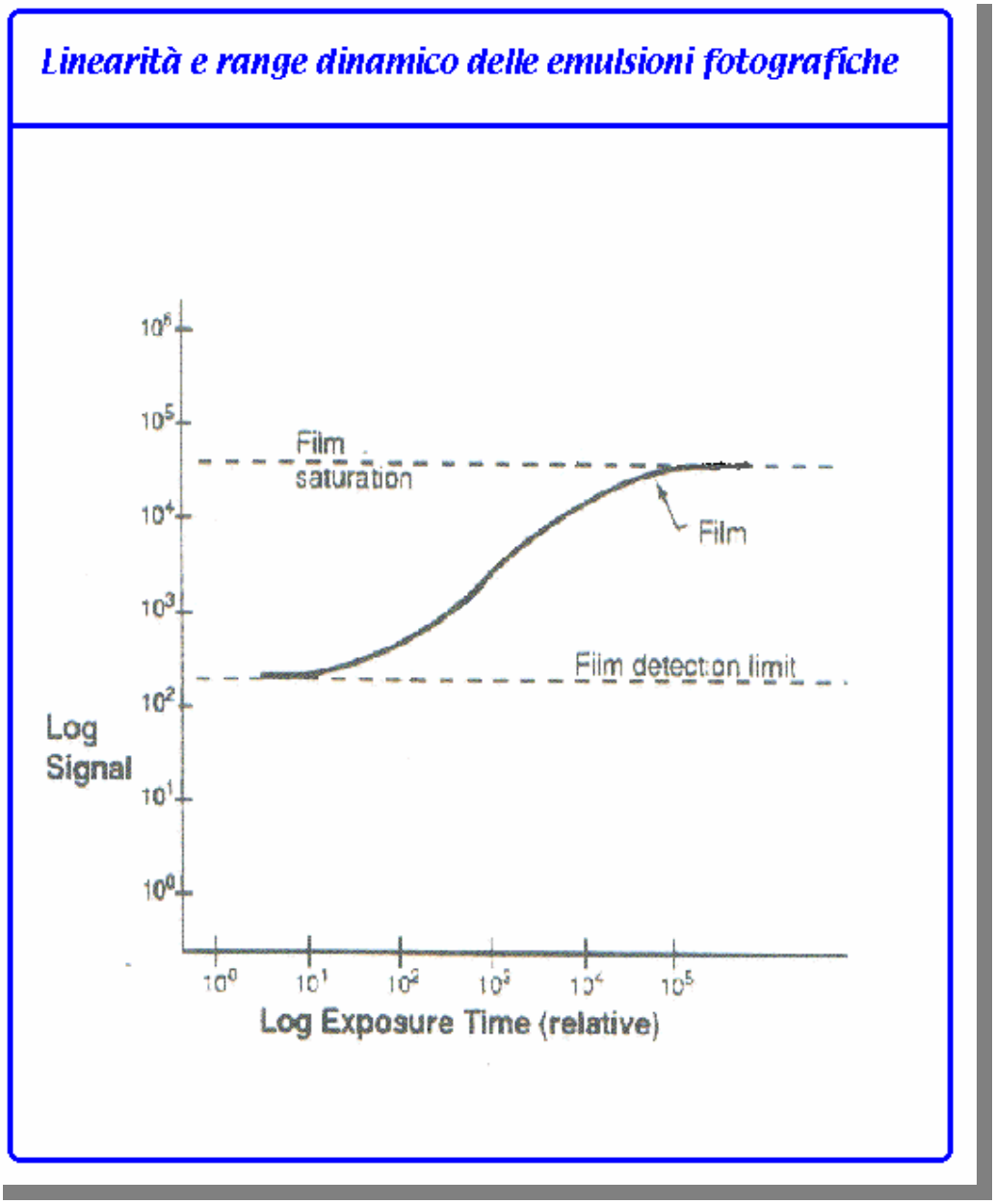
Characteristic curve of the film density against the time esposure (log/log)



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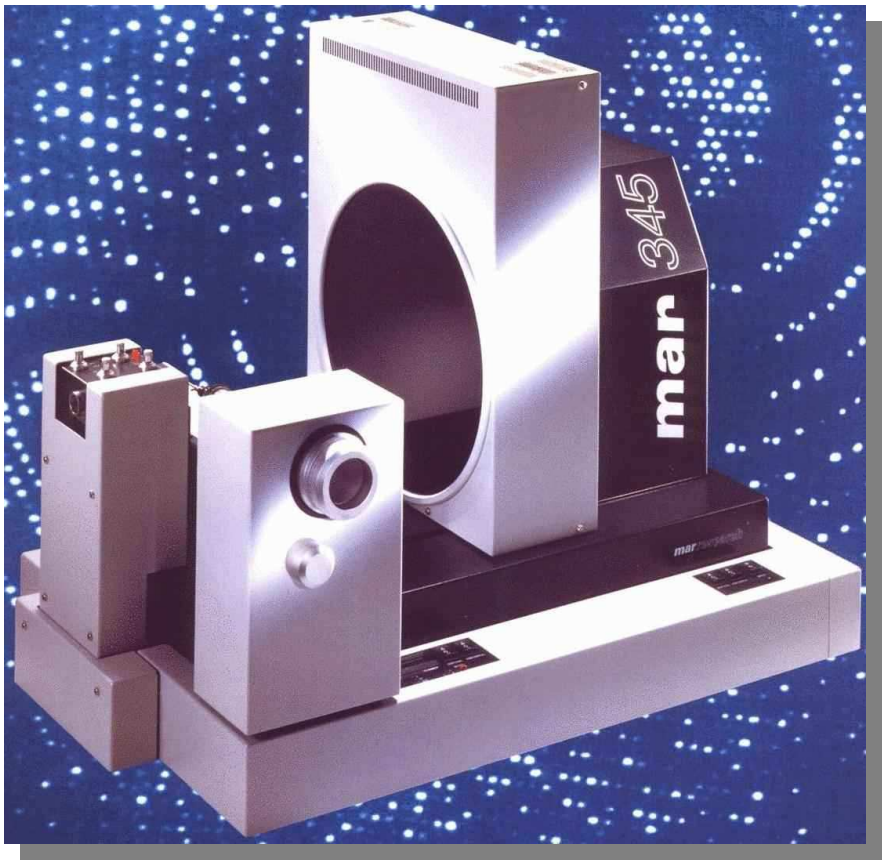
2Ddigital integrator detectors



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A commercial CCD detector

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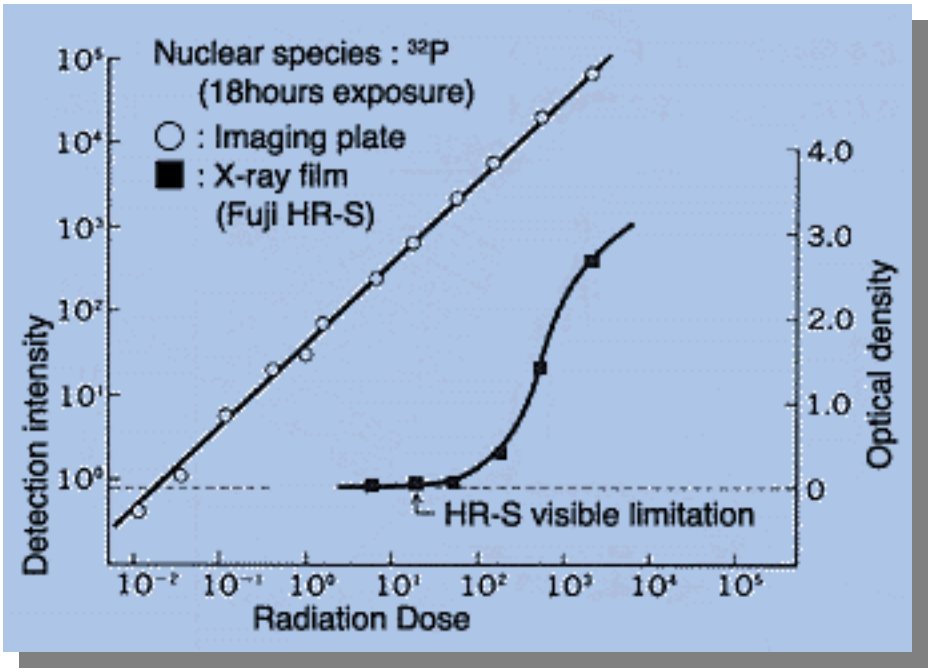
Comparison between linearity, dynamic range and efficiency



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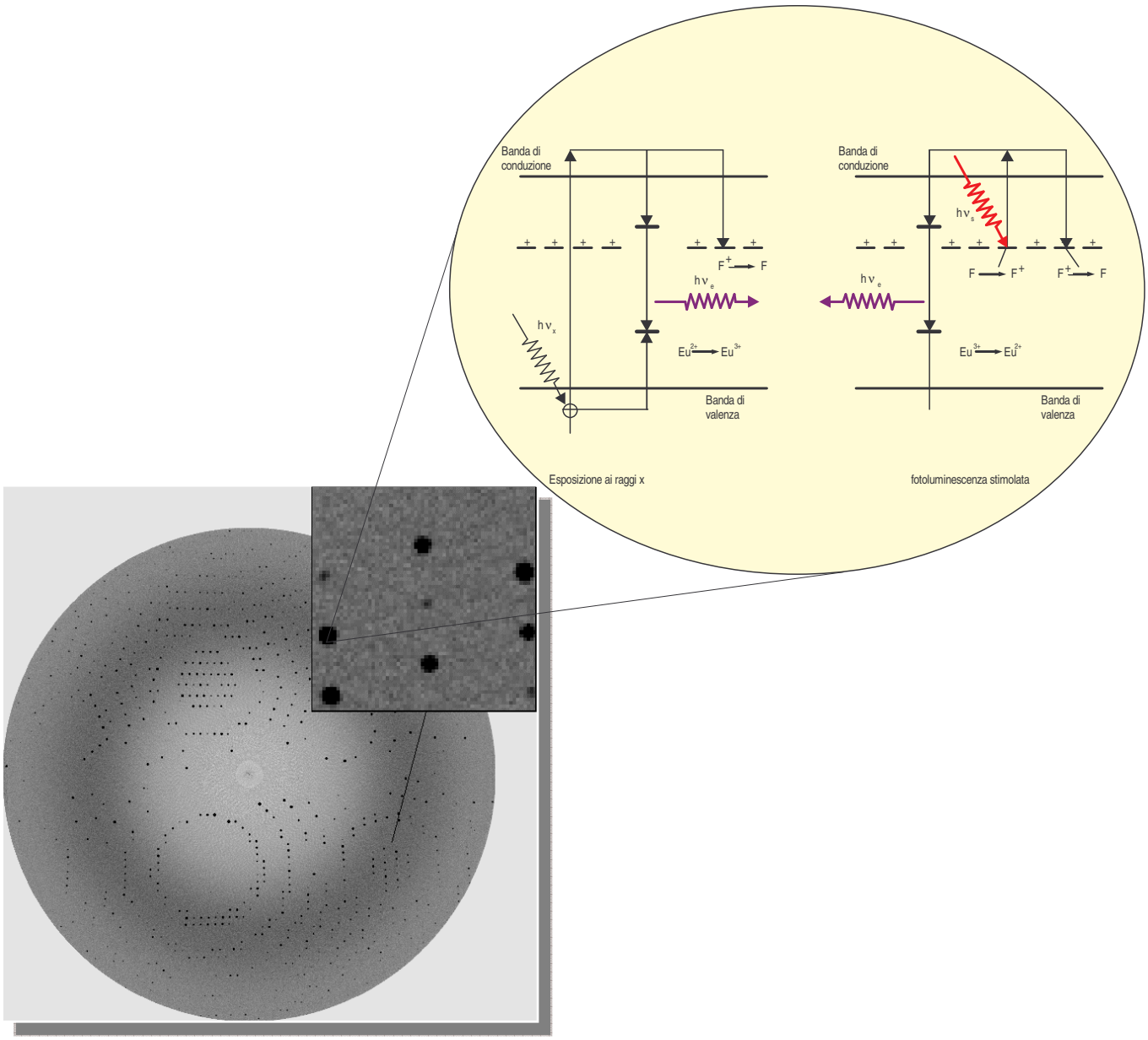
Physic of the Imaging Plate…….an analogical detector with digital readout



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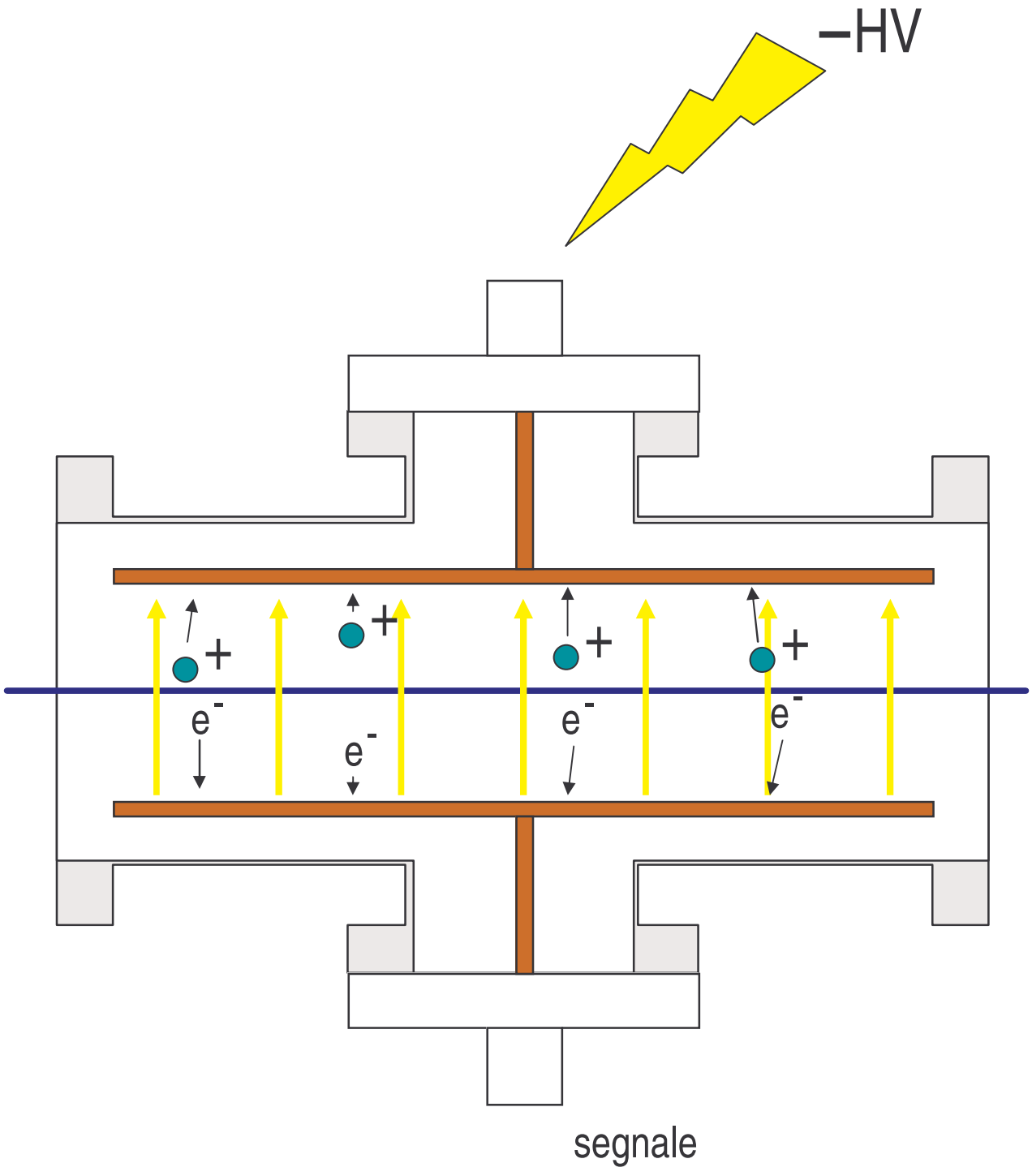
Gas detector : how does they work ?



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