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# Grating interferometry at 100 keV and 120 keV on lab sources

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## Objectives

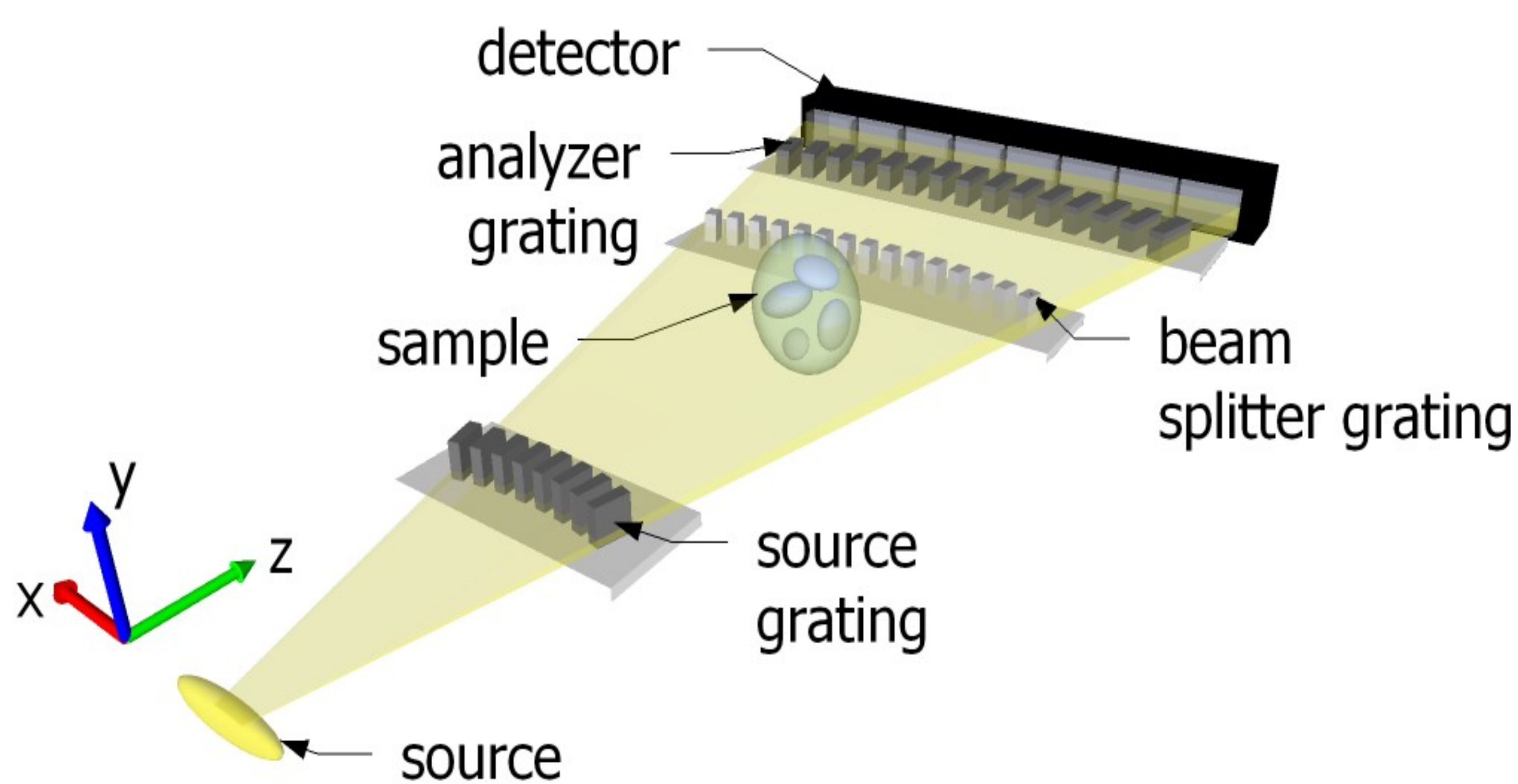
- Bringing grating interferometry in the energy range of medical and security systems.
- Overcome the limitations in the fabrication of the gratings.
- Explore the complementarity of the signals provided by the grating interferometer.

## Conclusions

- The feasibility of high-energy grating interferometry is shown for the first time
- The three complementary signals can be retrieved, although the preliminary results show a different behaviour of the scattering image compared to lower energy systems

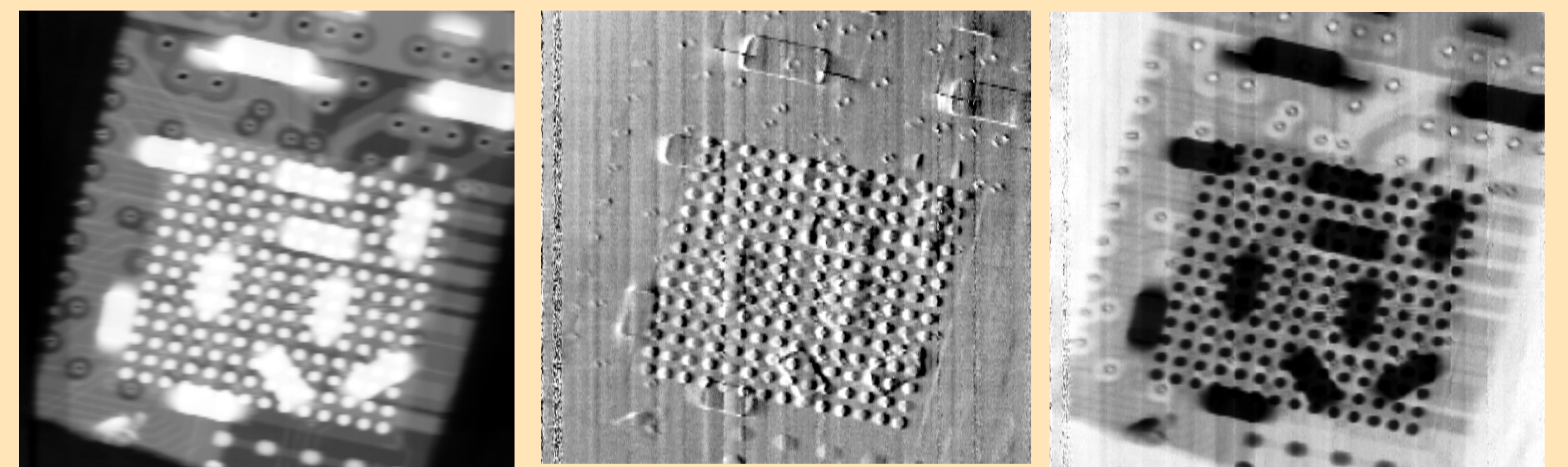
## The edge-on illumination

- The large thickness and small period needed by high-energy systems can be achieved only with an edge-on illumination.



## First images

- Scan of an electronic chip
- 2cm x 2cm field of view
- Average visibility between 5% and 6%
- Absorption, differential phase and visibility signals
- Long exposure (several hours)



- The gratings were manufactured by Microworks GmbH. The absorption gratings have a thickness of 800  $\mu\text{m}$ , all the gratings have a pitch of 2.8  $\mu\text{m}$ .

<b>Design energy</b>	100 keV	120 keV
<b>Intergrating distance</b>	15.8 cm	18.9 cm
<b>Total length</b>	54 cm	61 cm
<b>Beam splitter</b>	gold	nickel

## Outlook

- Medical and security applications need a high penetration power through large thicknesses and heavy materials.
- Improvements in the fabrication of the gratings will substantially decrease the exposure times.

## Publications

- C. David, B. Nöhammer, H. Solak, and E. Ziegler, "Differential x-ray phase contrast imaging using a shearing interferometer," Applied Physics Letters, vol. 81, no. 17, pp. 3287–3289, 2002.
- M. Abis, T. Thüring, Z. Wang, C. David, M. Stampanoni "X-ray phase-contrast imaging at 100 keV on a conventional source", submitted to Scientific Reports, 2014.
- C. David and M. Stampanoni, "A method for x-ray phase contrast and dark-field imaging using an arrangement of gratings in planar geometry", EP10167569.