X-ray imaging

Micro- radiography and Micro-CT laboratory of the Institute of Experimental and Applied Physics, CTU in Prague

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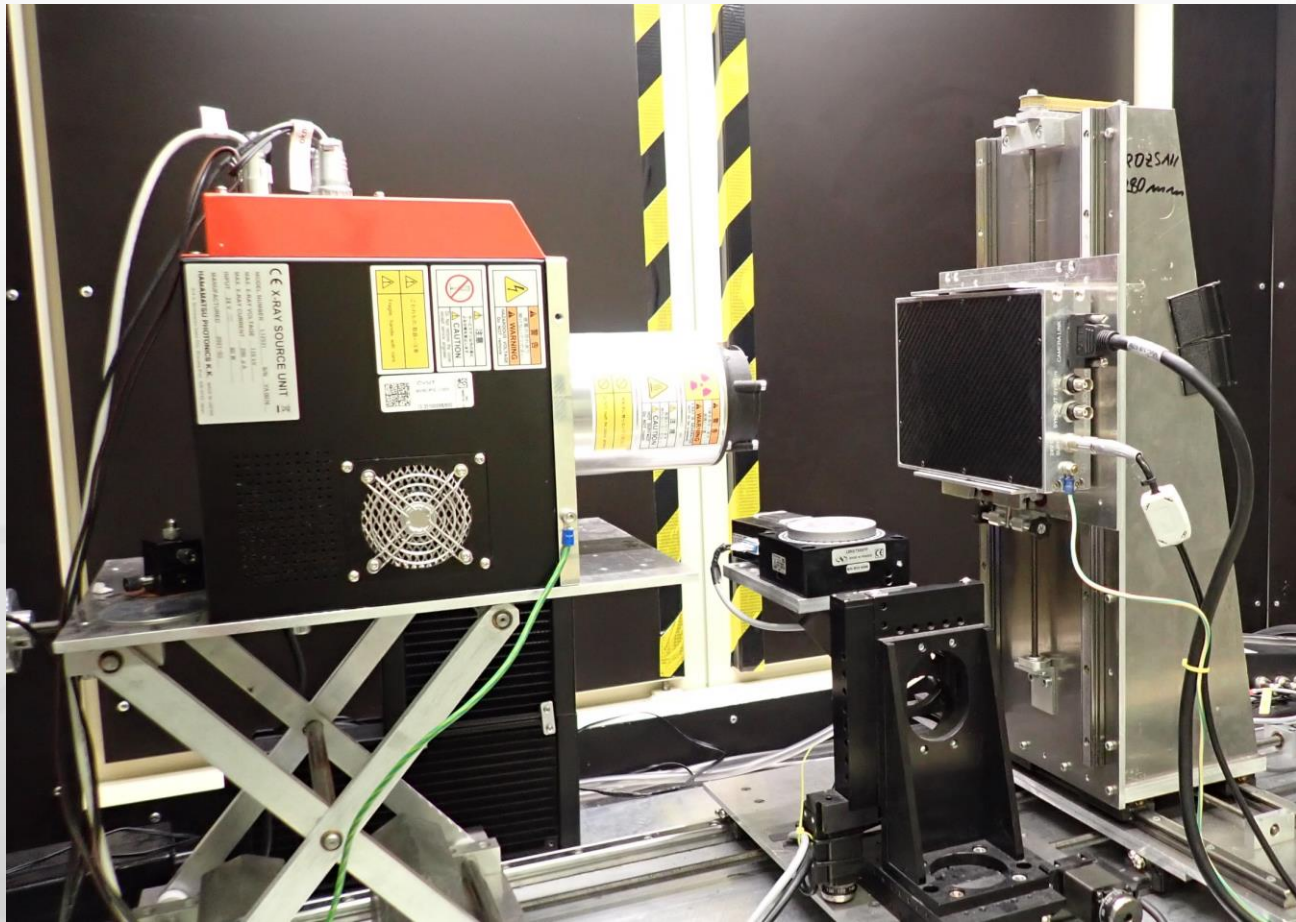
Exercise objectives

- Students will get experience with the basics of X-ray radigraphy and CT, in particular:
  - Mounting the sample, setting the imaging geometry and exposition parameters
  - Evaluation of the data quality by mean of SNR and CNR
  - Testing the effect ot the image magnification factor
  - Experimental estimation of the spatial resolutions of the data
  - Collection and processing of CT data

- Students are encouraged to bring their own samples for the CT analysis. The optimal sample contains complex internal structures and its size is between 1 and 5 cm. Samples composed of organic materials are preferred.

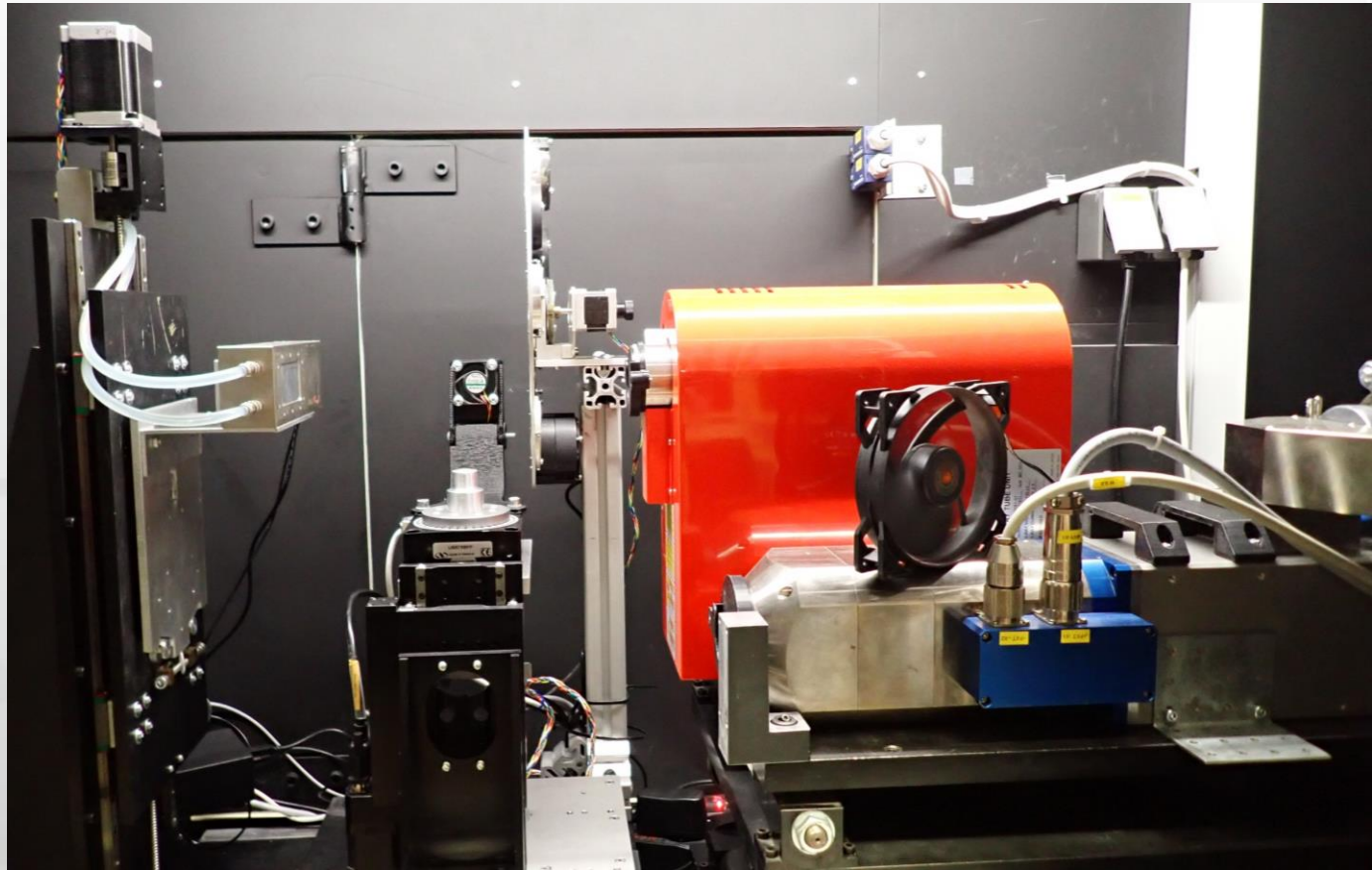
Available imaging systems

- X-ray system Micro
- Source: Hamamatsu L12531 (40 – 110 kV, 16 W)
- Detector: Dexela 1512 flat-panel (1944 × 1536 pixels, 74.8 µm pixel pitch)
- Achievable resolution: 2 µm
- Optimal sample size 5 – 100 mm



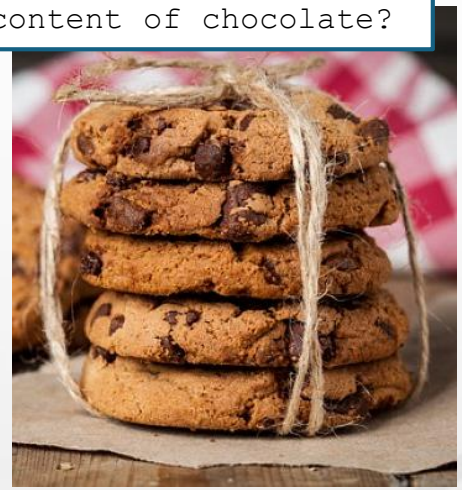
Available imaging systems

- X-ray system Nano
- Source 1: FeinFocus FXE-160.51 (40 – 160 kV, 16 W)
- Source 2: Hamamatsu L12161-07 (40 – 150 kV, 75 W)
- Detector: Variety of different Medipix- and Timepix-based large area detectors with different sensors
- Achievable resolution: < 1 µm
- Optimal sample size 0.5 – 50 mm



CT can answer questions…

Need to know the content of chocolate?



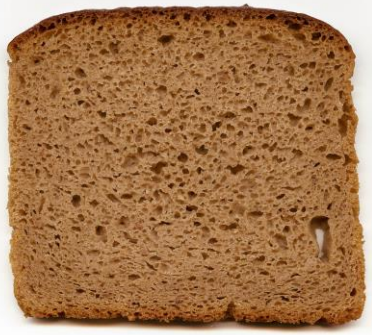
In which one is the best toy?

How do its muscles look like?

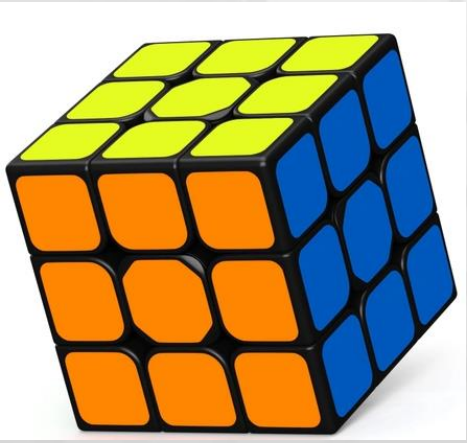
How many candies are in the box?

Have you ever thought about how the lock looks like?

Do you know average size of cavities in bread?



Do all the matches have the flamable head?

Is there a worm inside?

…or you can use CT just out of curiosity