

# X-Radiography of archaeological sample

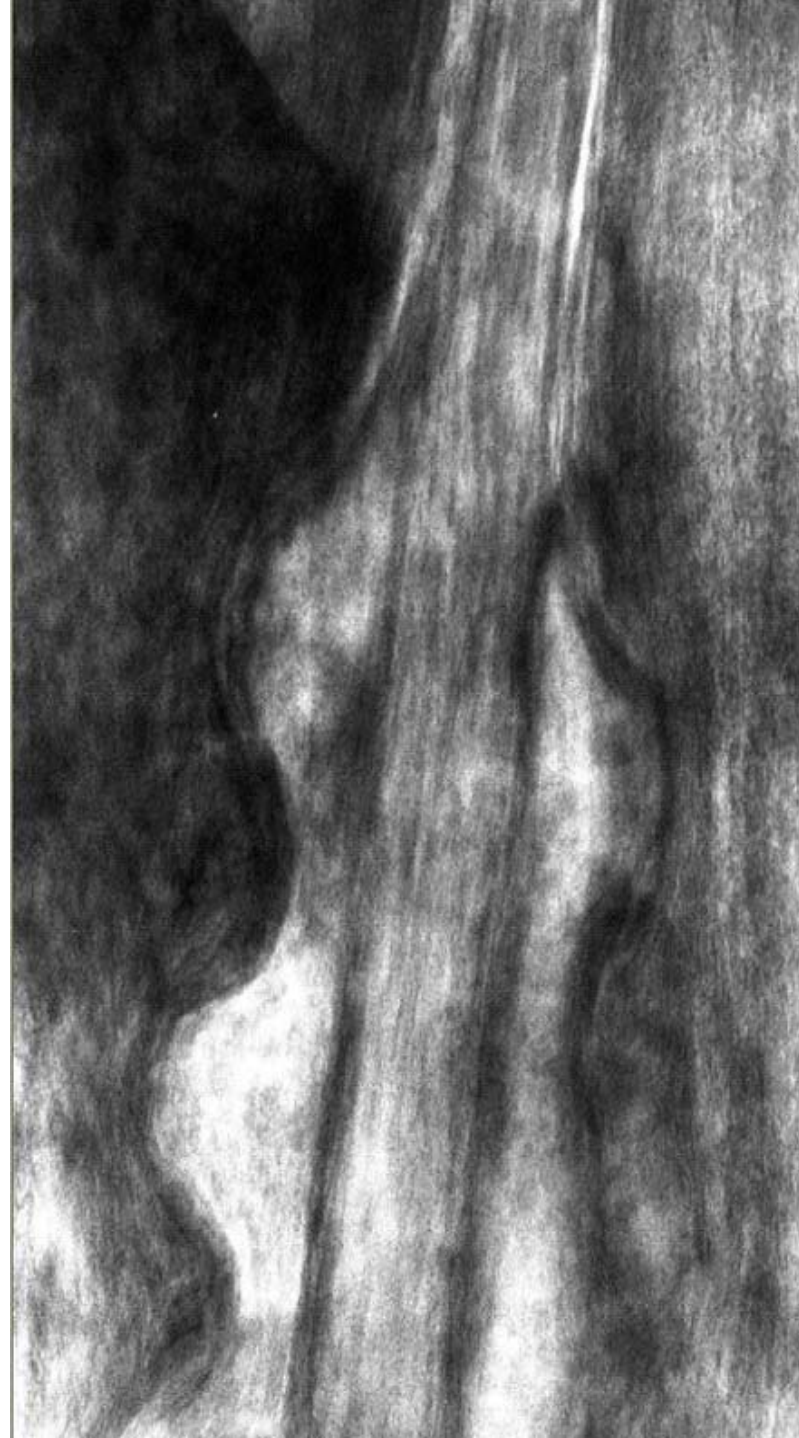
Kirsi Leppänen  
University of Helsinki

# X-radiography

- A fast and **non-destructive** investigation method

Important with archaeological samples!

- Provides the information needed for identify, classify, illustrate or date the object
- Reveals the shape, size, structure, surface features and details of the sample



# X-ray radiography

- Sample is exposed by X-ray beam
- Image is generated by the variations in absorption due to thickness and composition of the sample



# Samples

- Iron spear head from Poland
- Owner:  
Archaeological Museum, Warsaw;  
professor Wladyslaw Weker
- It was found in the grave in Czersk
- The grave might belong to  
Masovian prince from 12th century

- Three pieces: one bigger part, one smaller part and the top of the spear head
- All of them are under a thick layer of corrosion products and organic substances

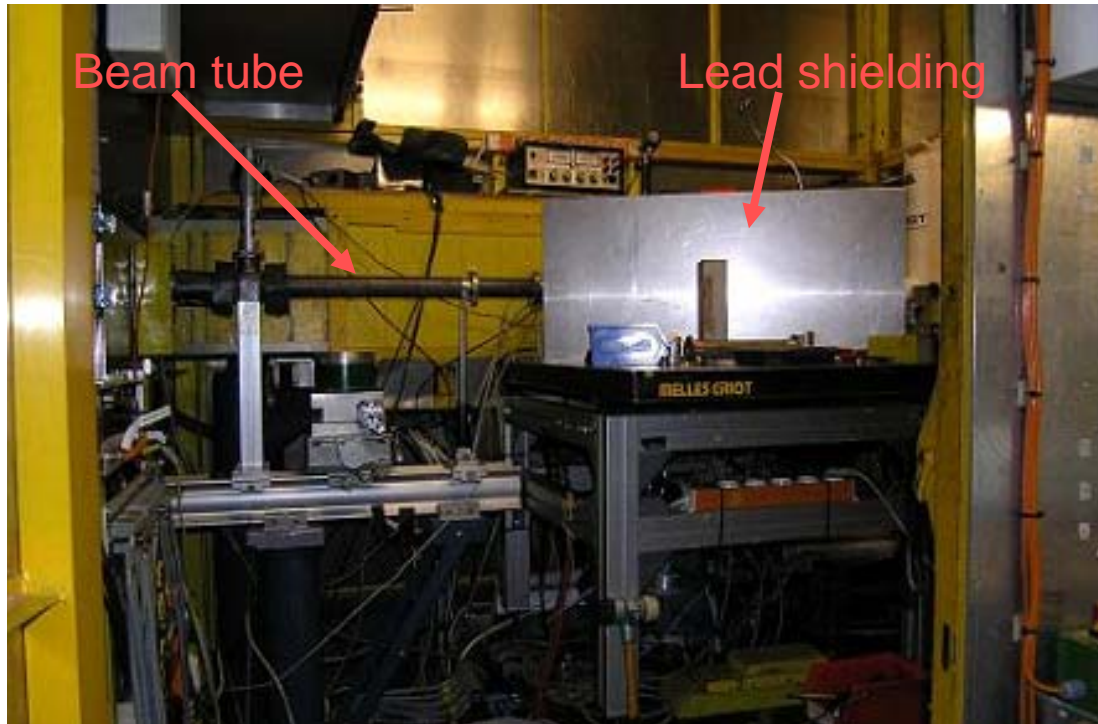
# Samples



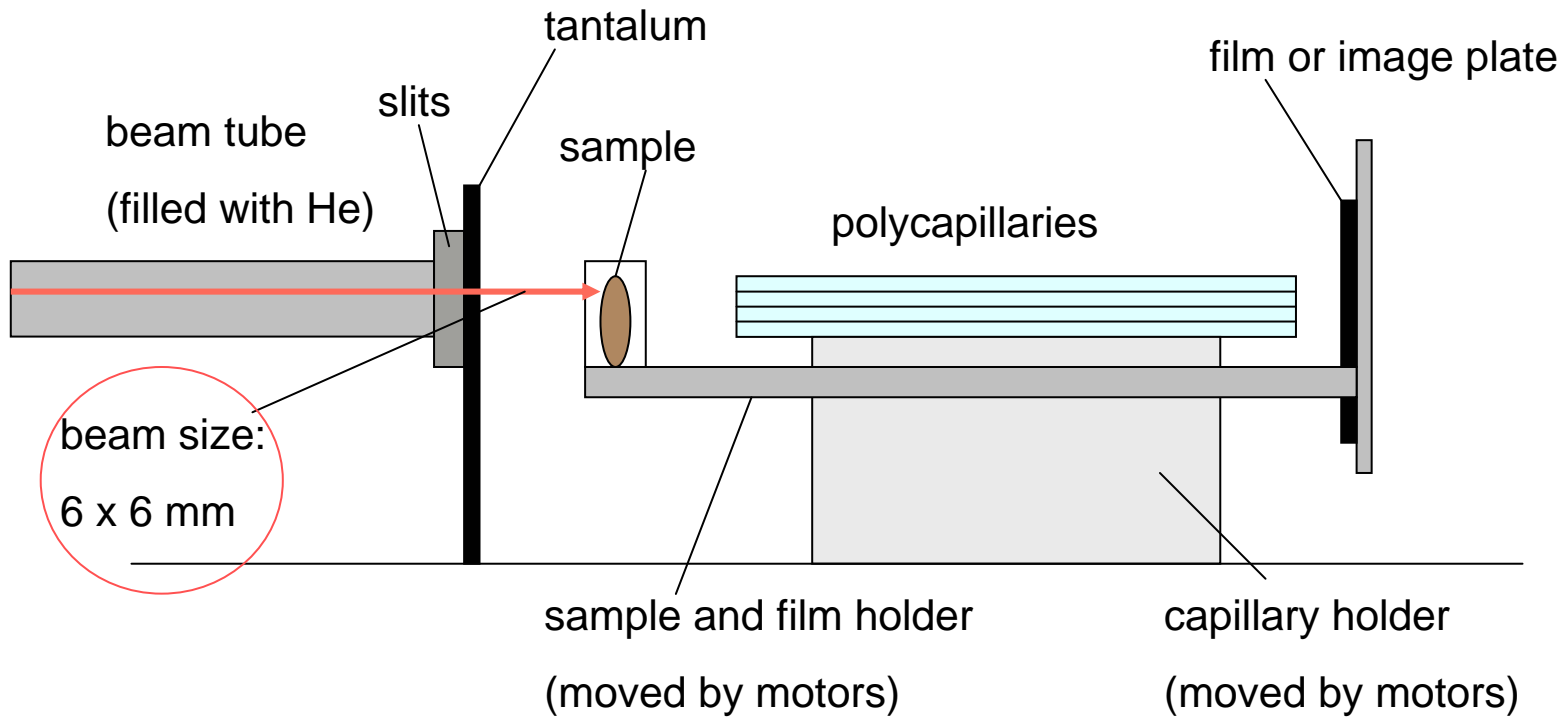
# Measurements @ F3

- HASYLAB beamline F3
- **White beam**=includes all the x-ray wavelengths
- Testing polycapillaries between the sample and detector to suppress the scattering
- Both image plates and x-ray films were used as detectors

This is how the hutch looks like:



# Set-up

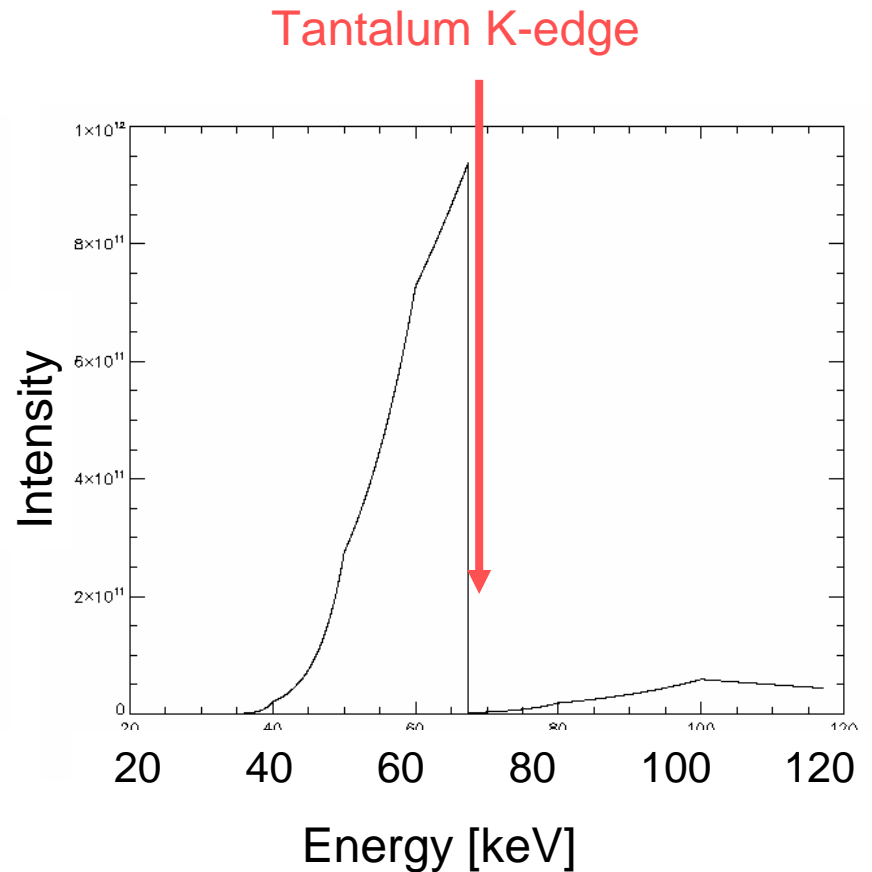
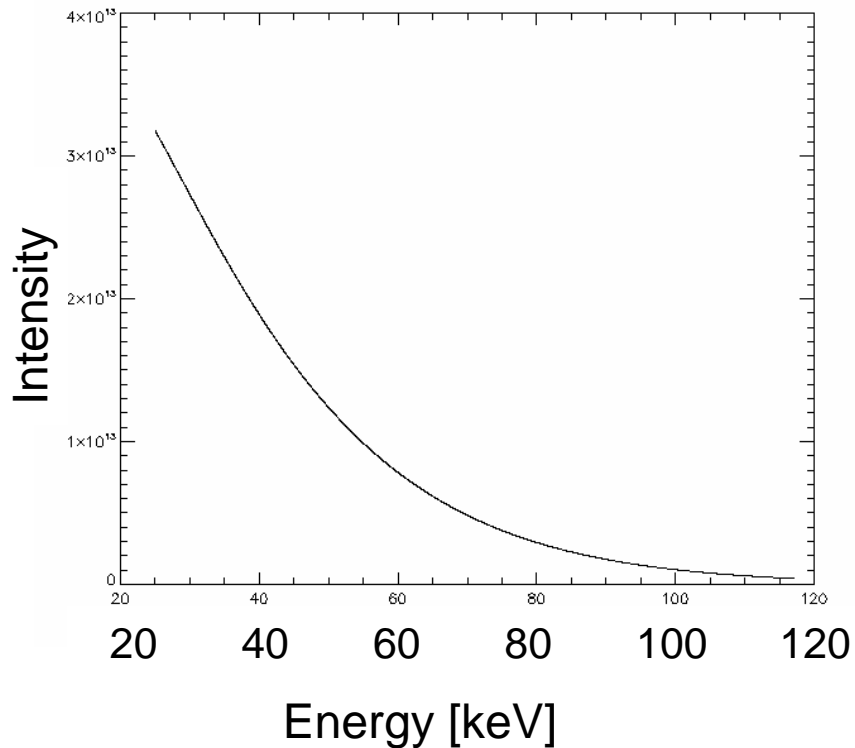


# Problems

- High intensity caused severe problems with image plate and film saturation: they were too sensitive.
- Solution: thin tantalum plate in front of the beam
- the beam was no more white beam, because the low energy part of spectrum was cut off.



# Beam spectrum before and after 0.4 mm tantalum

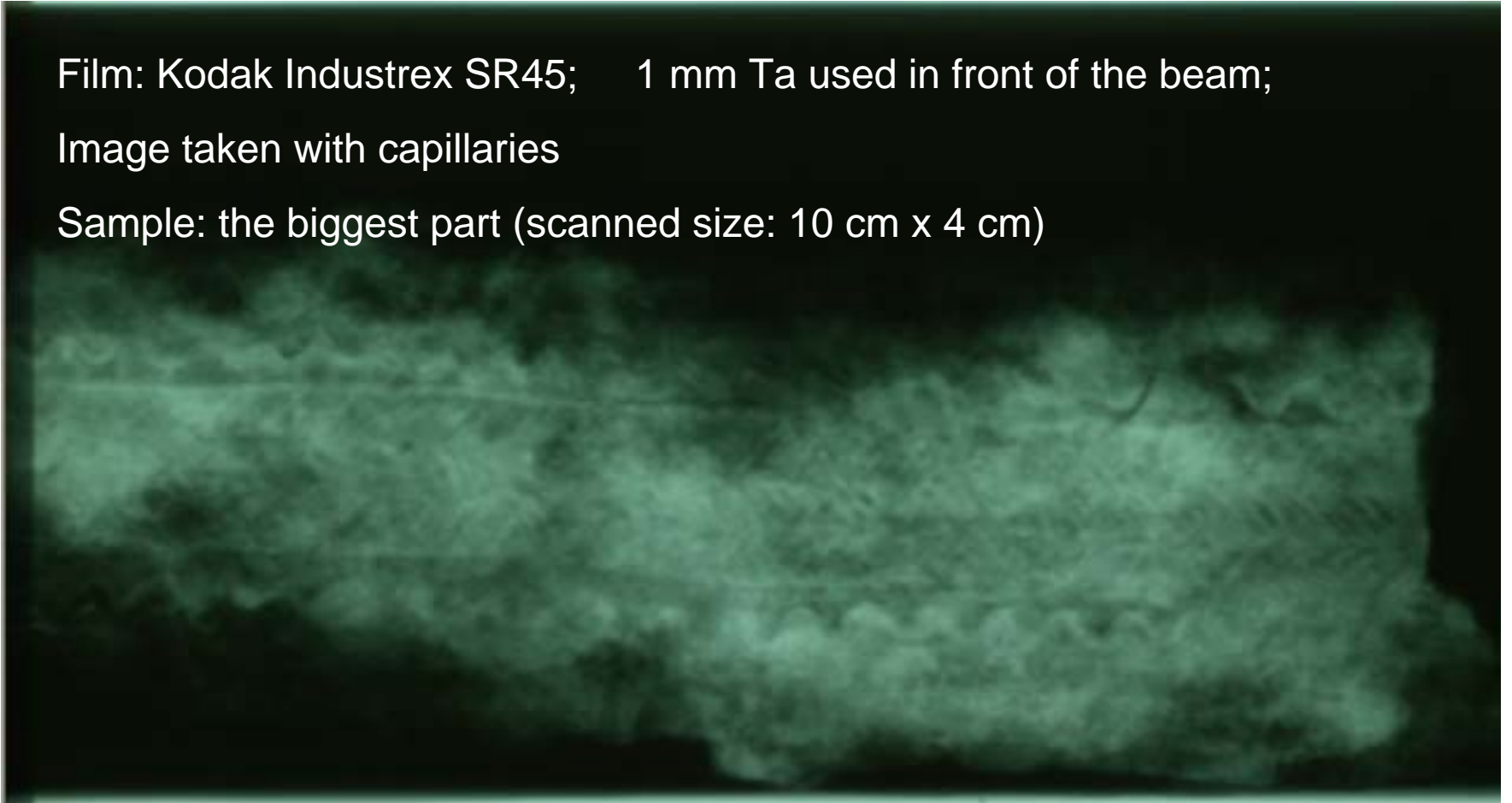


# 1. Film result

Film: Kodak Industrex SR45; 1 mm Ta used in front of the beam;

Image taken with capillaries

Sample: the biggest part (scanned size: 10 cm x 4 cm)



# The top

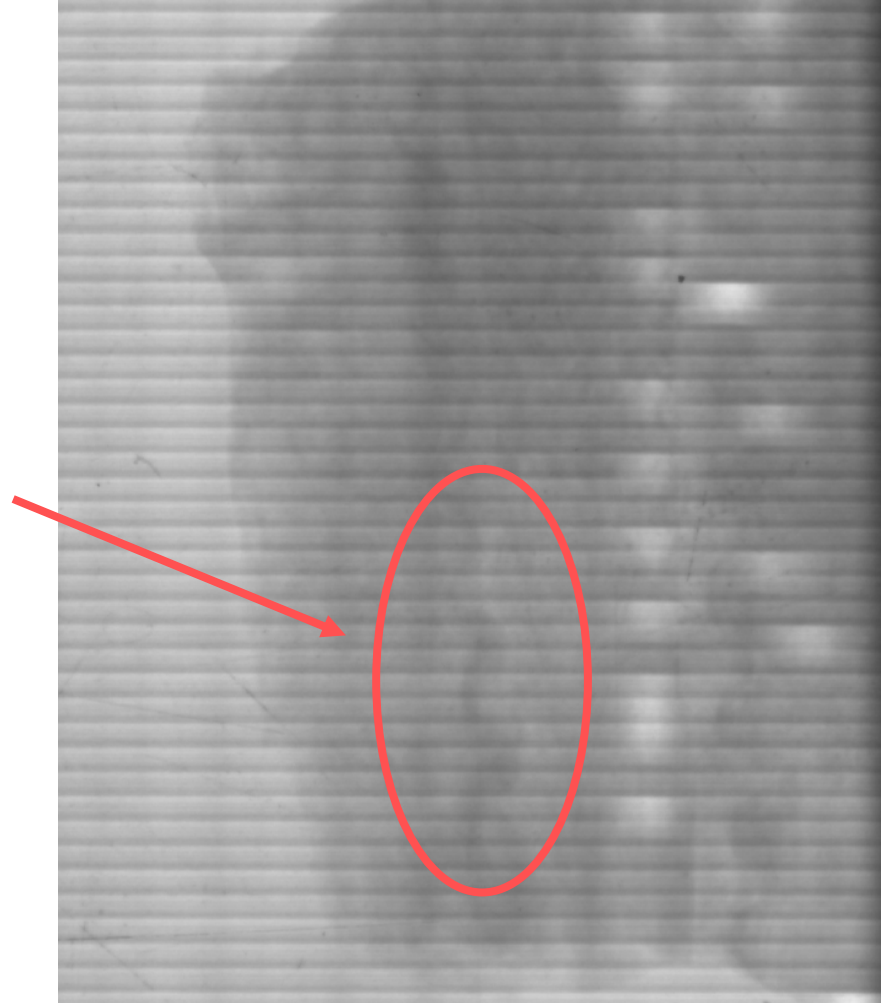
- Pattern continues through the whole spear head

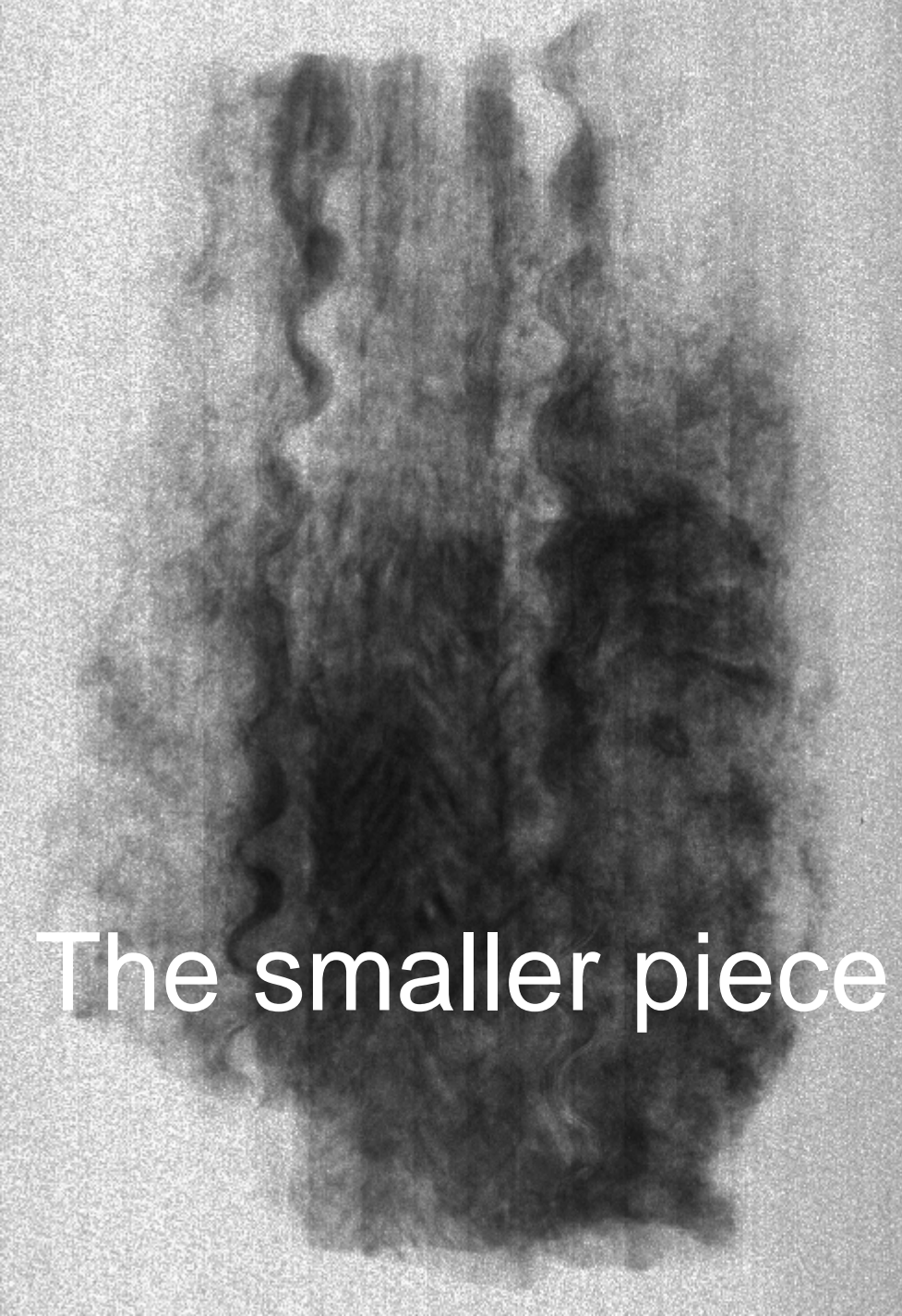


# Film



# Image plate





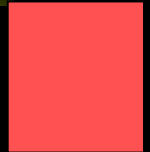
The smaller piece

# Conclusions

- Good results by using X-ray films, image plate was too sensitive
- No need for polycapillaries in this case, because there was no huge amount of scattering. That was due beam hardening by tantalum.



**Thank you for your attention!**



Sources for the two images of the castles:

Slide 4: [www.dkimages.com](http://www.dkimages.com)

Slide 15: <http://biega.com/photoalbum/pl-czersk1.jpg>