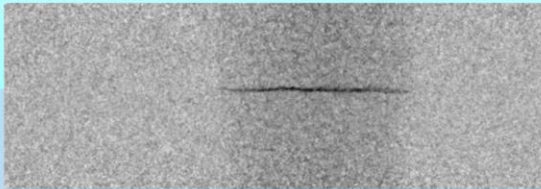


## Low contrast imaging

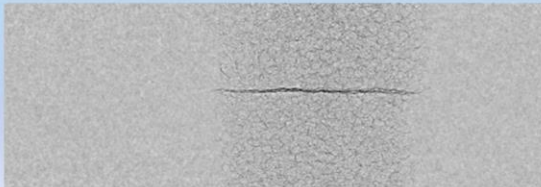
The advantage of phase contrast

- A very quick illustration of the advantages of x-ray phase contrast CT

## Projection images, 32 keV



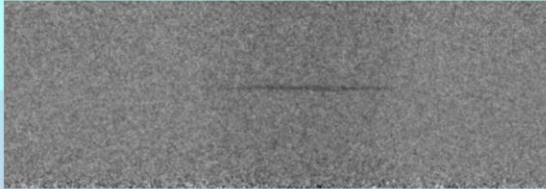
- 0 m
- Tx (avg) 98.5%
- Background 1.002, std devn 0.009



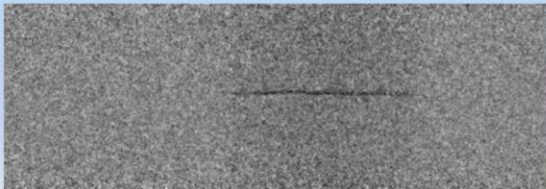
- 6 m
- Tx (avg) 98.1%
- Background 0.998, std devn 0.009
- Note the fringing around the foam cells.

- These are projection images of a small (20 mm cubed) piece of plastic packing foam.
- The darker line across the middle is where two pieces are glued together.
- At 32 keV the foam is almost transparent. Only 1.5% of the x-rays are absorbed.
- These images have been calibrated using 'flat and dark' correction. Each pixel gives the transparency of the object compared to air.
- As illustrated in Andrew's talk on phase contrast. By moving the detector back by 6 metres the effect of phase shifts can be seen.

## Projection images, 80 keV



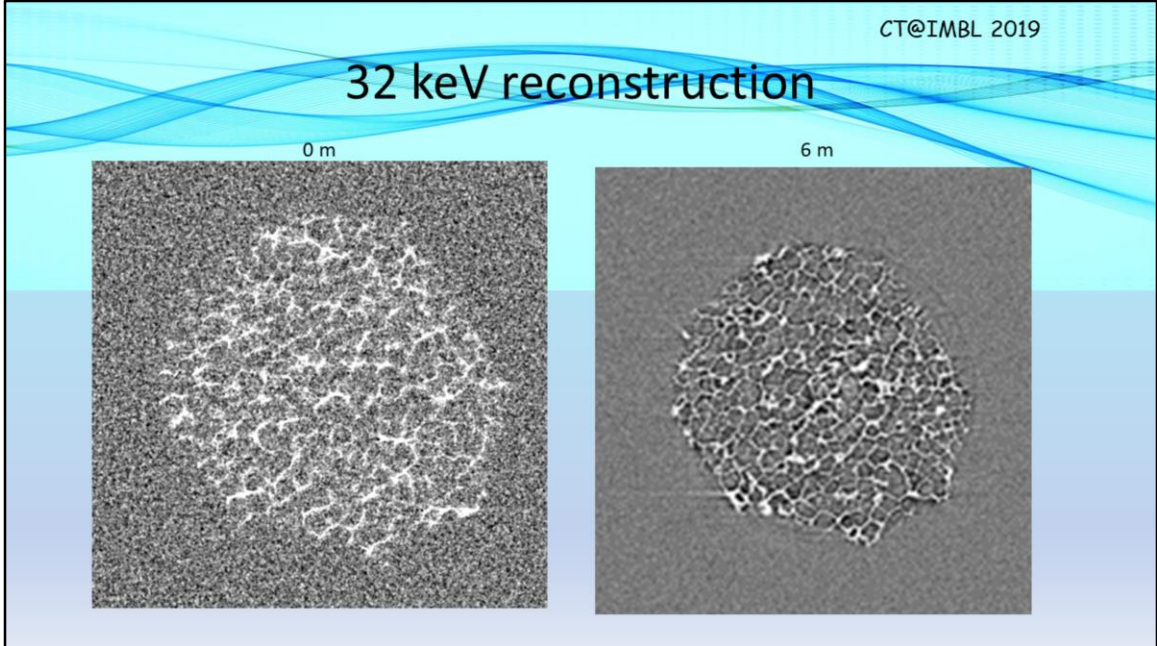
- 0 m
- Tx (avg) 98.8%
- Background 1.002, std devn 0.014



- 6 m
- Tx (avg) 98.9%
- Background 1.001, std devn 0.014

- Increasing the beam energy to 80 keV the transparency of the foam goes up. It now only absorbs 1.2% of the photons.
- It's almost invisible in the projection images.

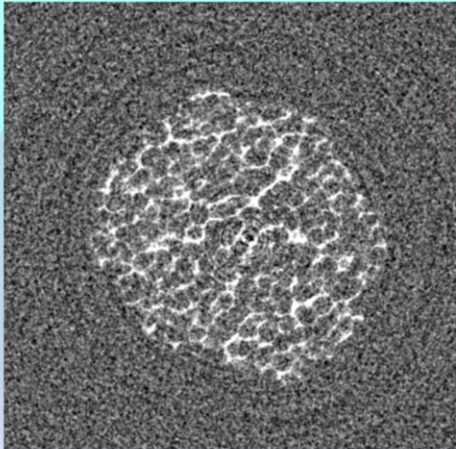
## 32 keV reconstruction



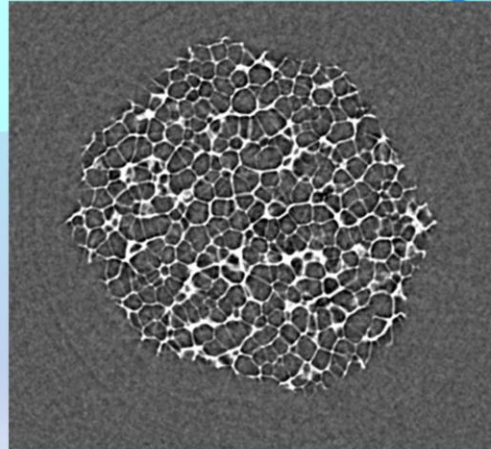
- Running a CT reconstruction on this data set produces a very noisy image when using the data set with no phase contrast.
- The same reconstruction on the 6 metre distant data set gives much better results.
- Note; These reconstructions was made without attempting 'phase retrieval'. So the edge enhancement in the foam cells is purely from the physics.

## 80 keV reconstruction, phase retrieved

0 m



6 m



- Using phase retrieval has little effect on the data with no phase contrast.
- There is a low pass filtering enhancement of the signal to noise ratio, but nothing else.
- On the other hand the 6 metre set with phase contrast looks good. Even with such a low transparency.