

Getting most out of ‘expensive’ micro CT data

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- Background and research problem
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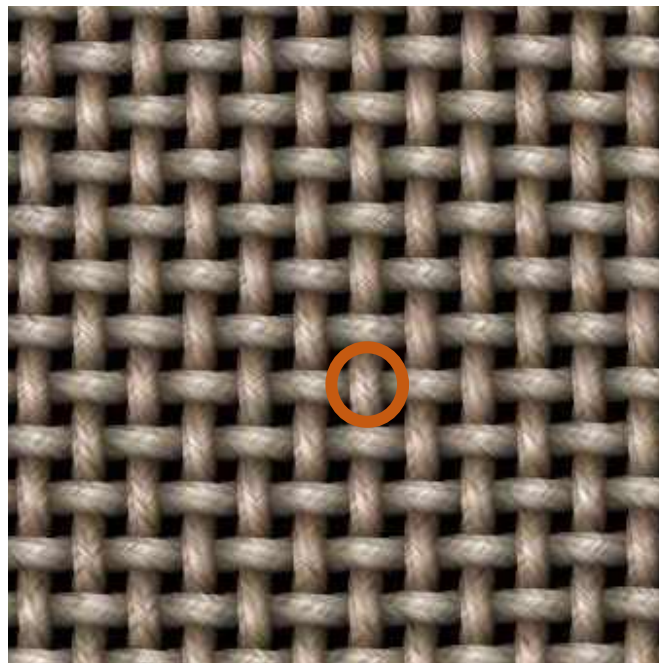
Clothes

Aesthetics

Durability



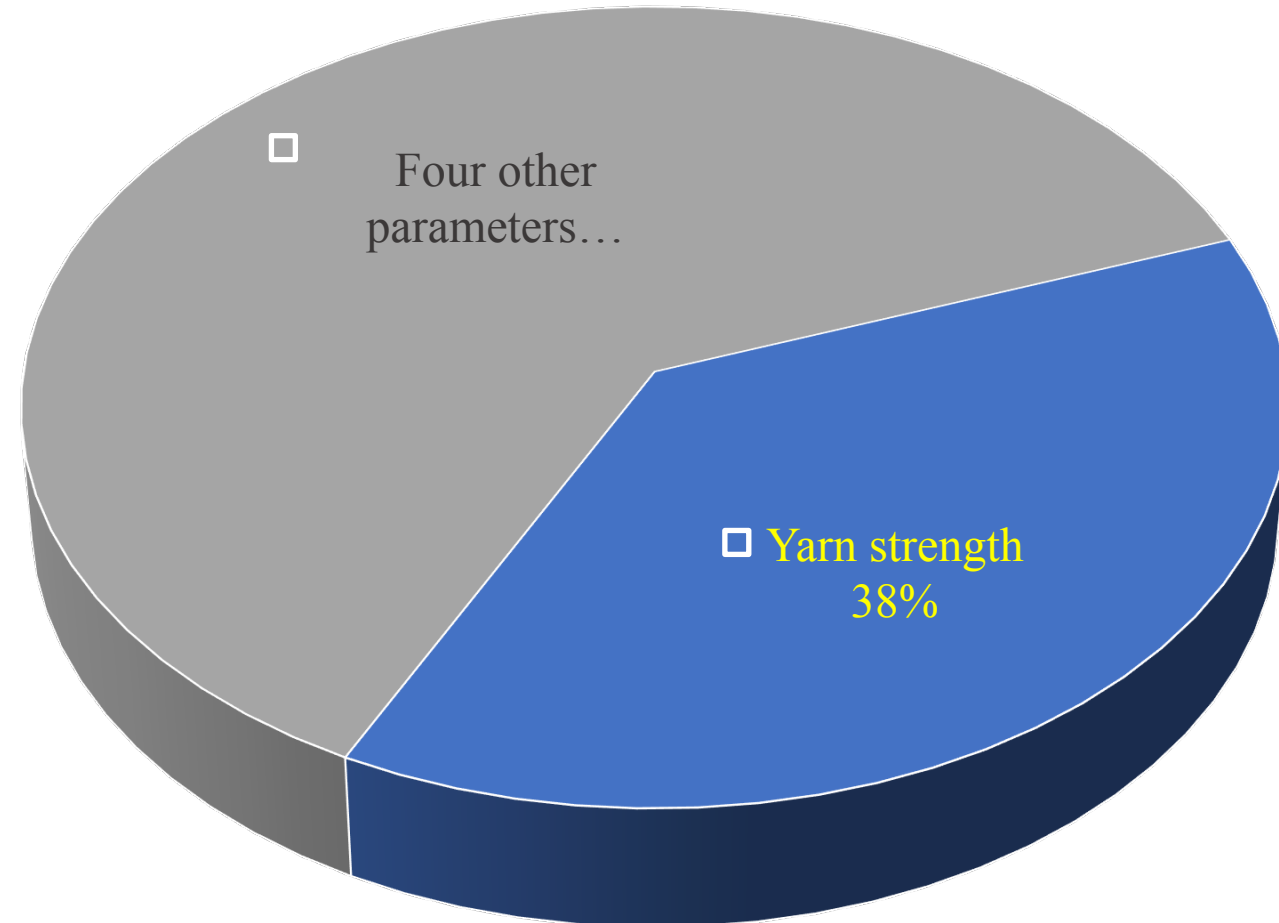
Fabrics



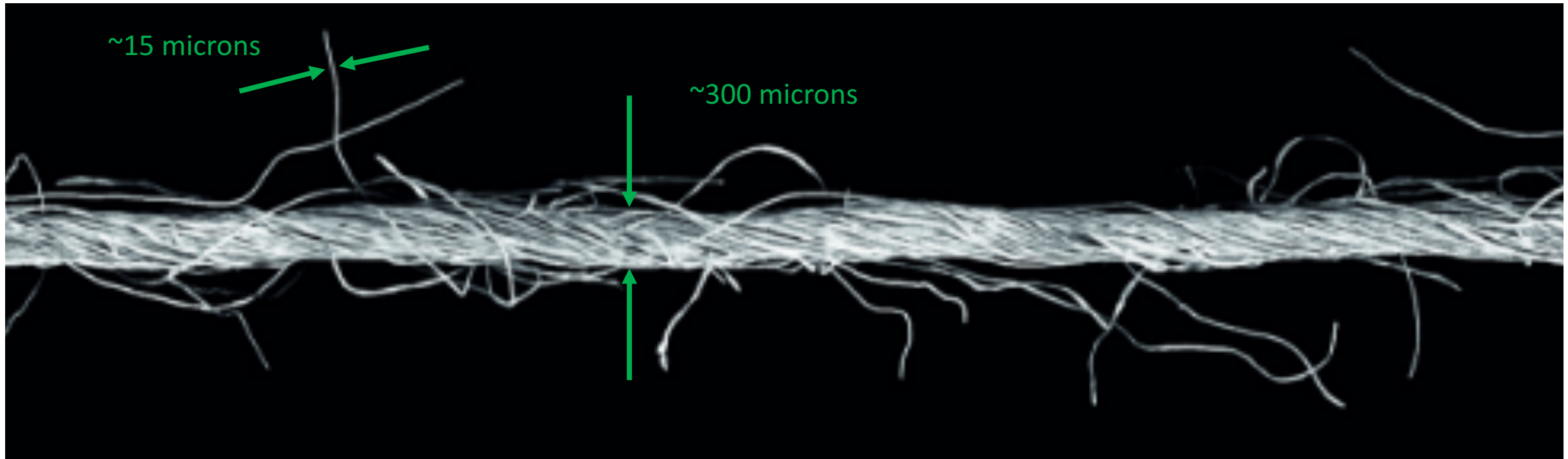
Yarns



Factors affecting fabric strength

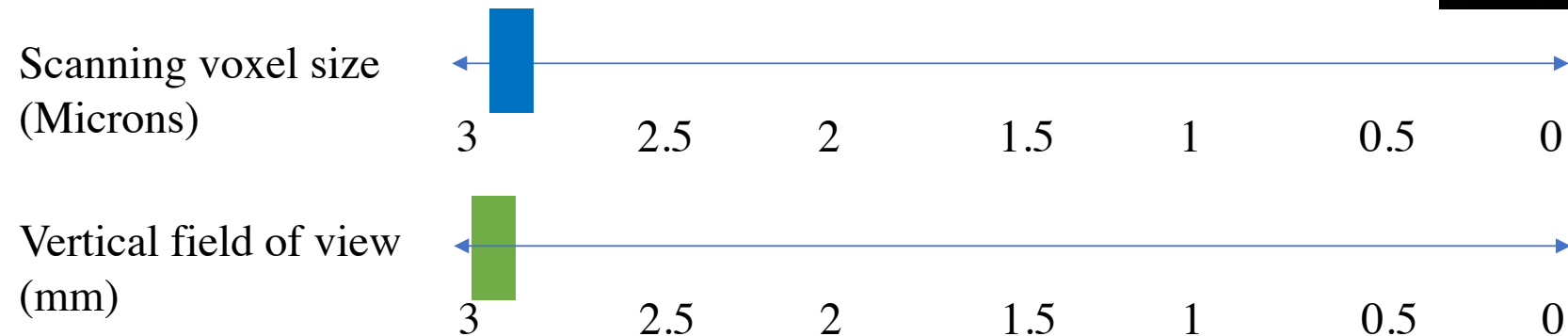
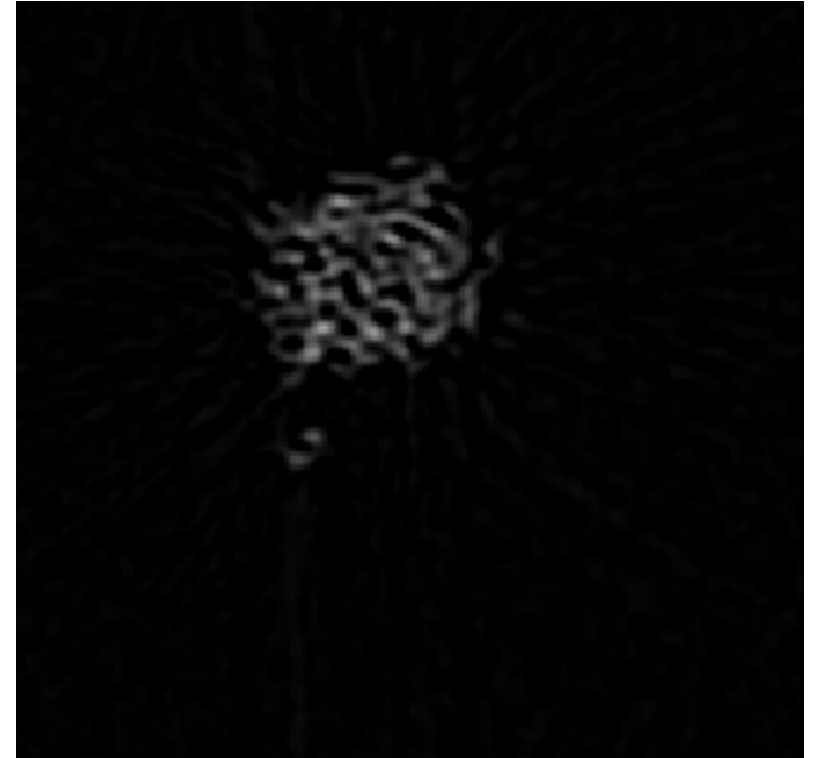


Textile yarn structure



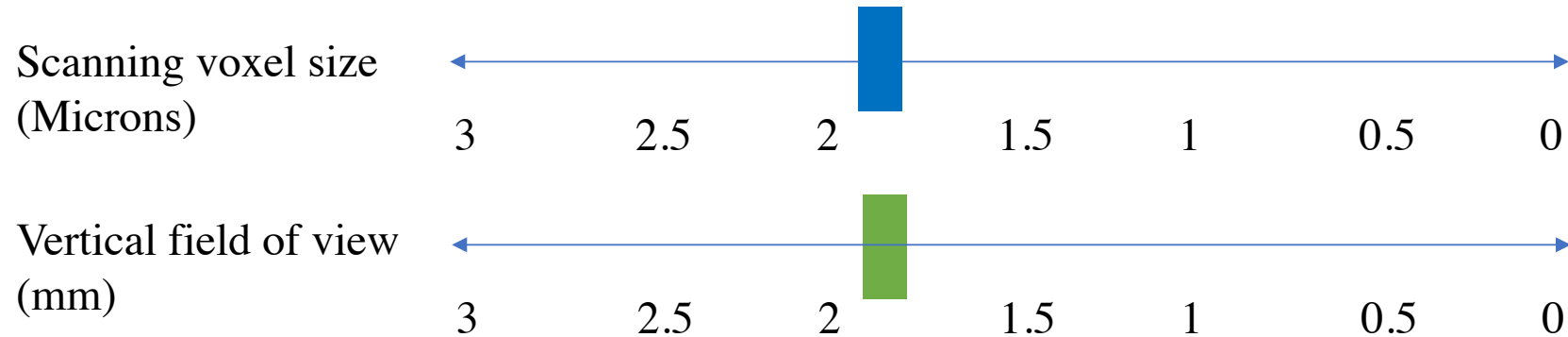
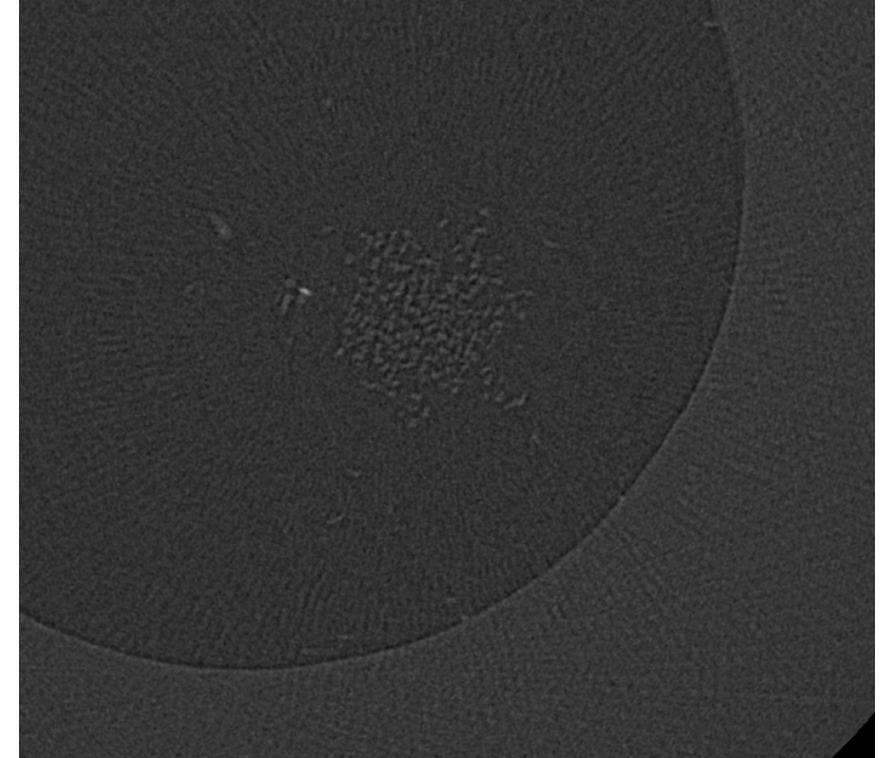
Micro CT trials

System: Skyscan 1172
Facility: The University of Sydney
Energy: 40 Kev
Mag: 10x



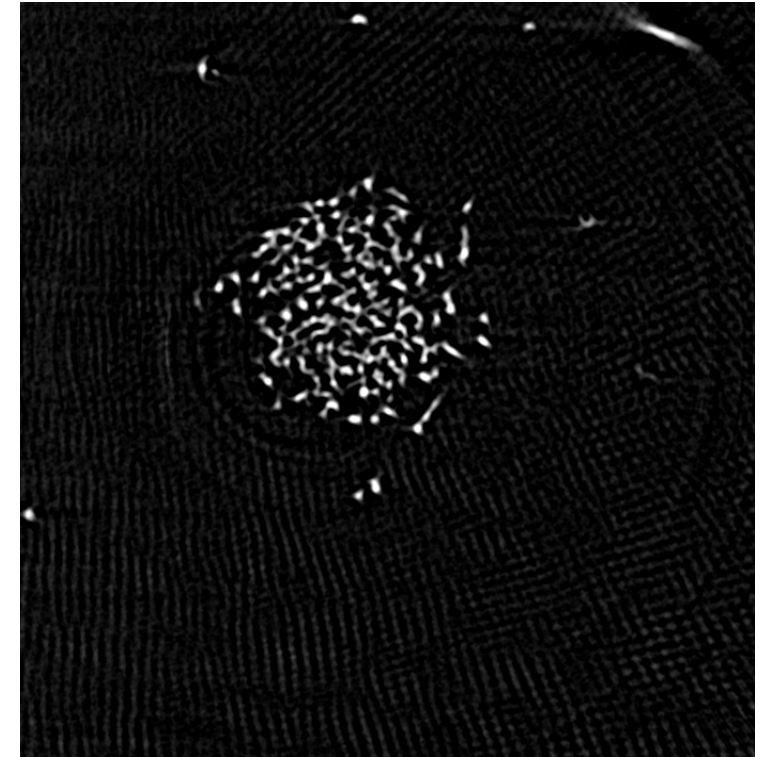
Micro CT trials

System: Xradia 520 versa
Facility: Monash University
Energy: 80 Kev
Mag: 10x

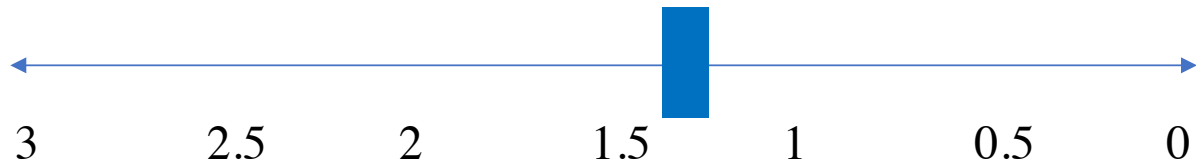


Micro CT trials

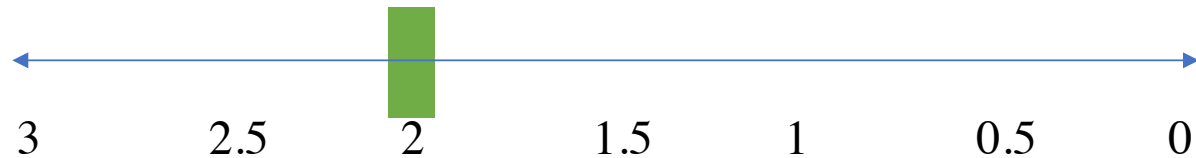
System: CSIRO, (in house built)
Facility: CSIRO / Monash
Energy: 30 Kev
Mag: 10.95x



Scanning voxel size
(Microns)

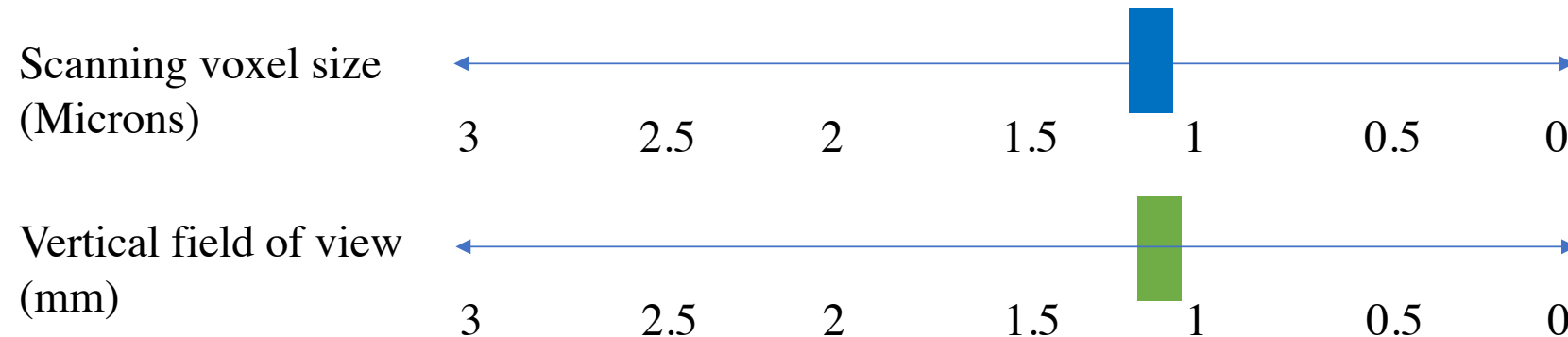
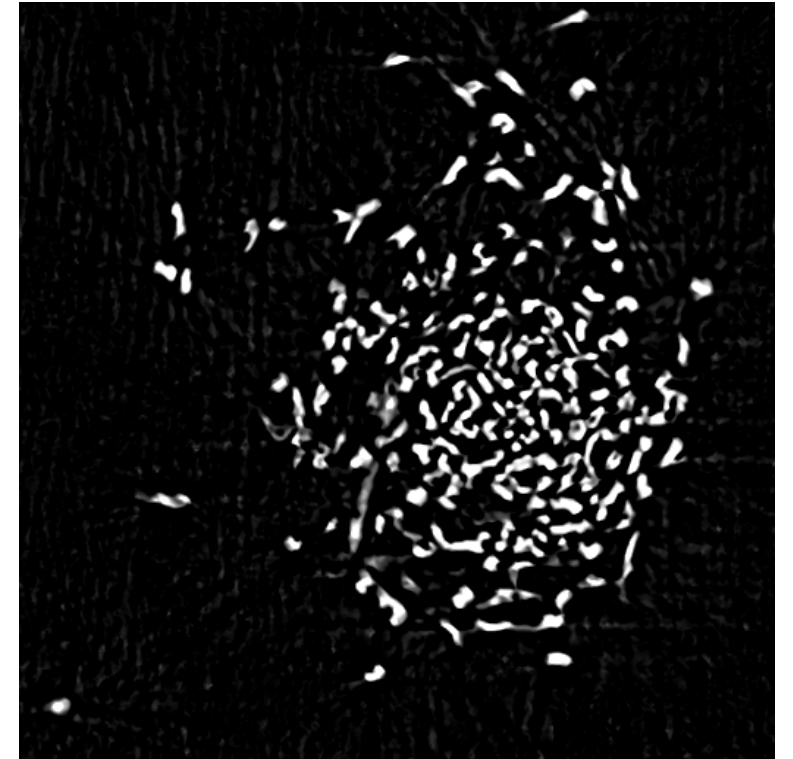


Vertical field of view
(mm)



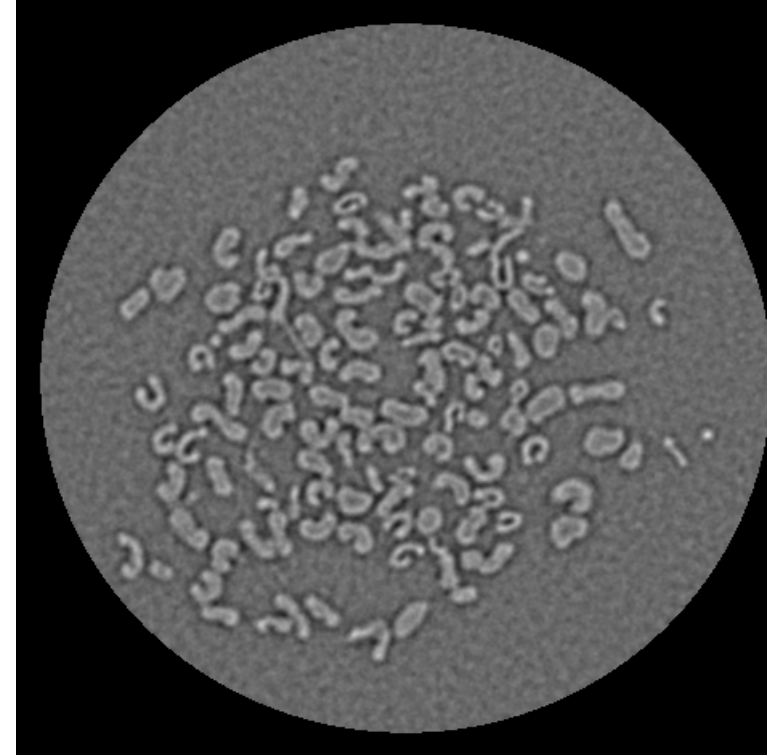
Micro CT trials

System: X-radia MicroXCT-400
Facility: The University of Sydney
Energy: 40 Kev
Mag: 10x

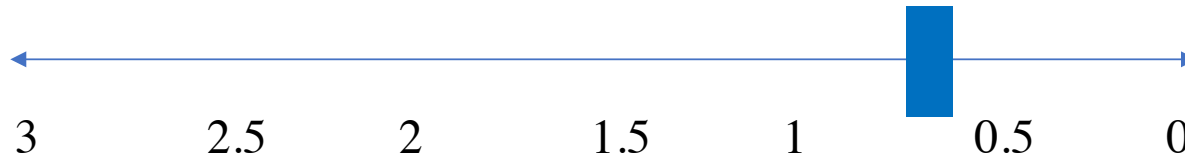


Micro CT trials

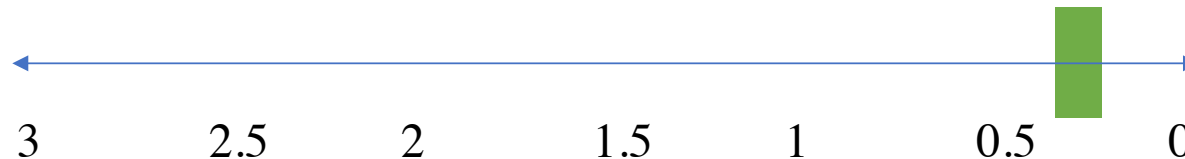
System: X-radia Versa
Facility: Monash University
Energy: 80 Kev
Mag: 40x



Scanning voxel size
(Microns)

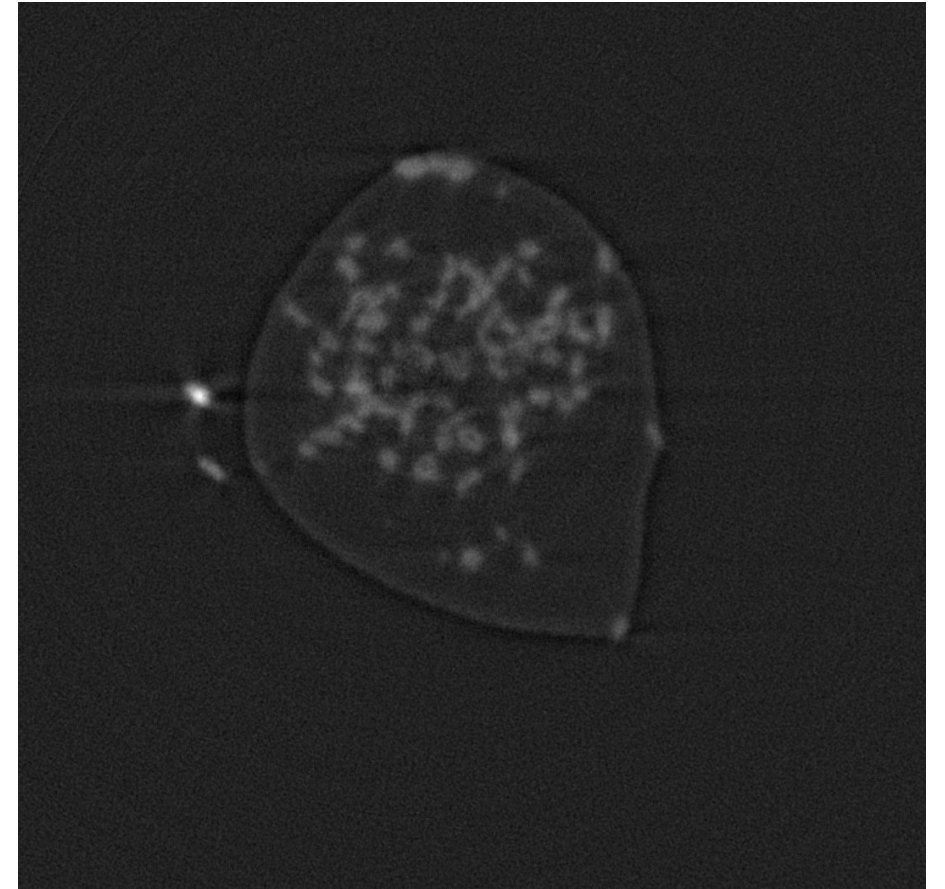


Vertical field of view
(mm)

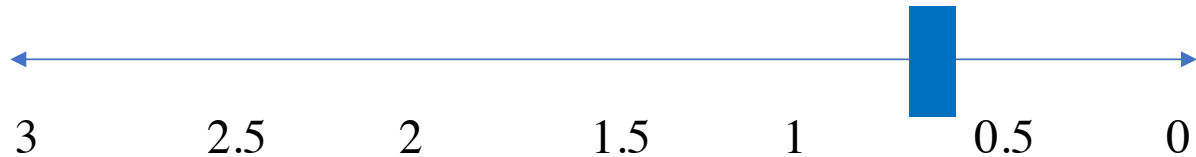


Micro CT trials

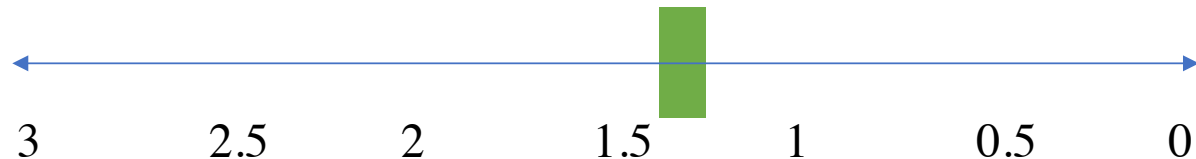
System: IMBL
Facility: Australian Synchrotron
Energy: 30 Kev
Mag: 10x



Scanning voxel size
(Microns)

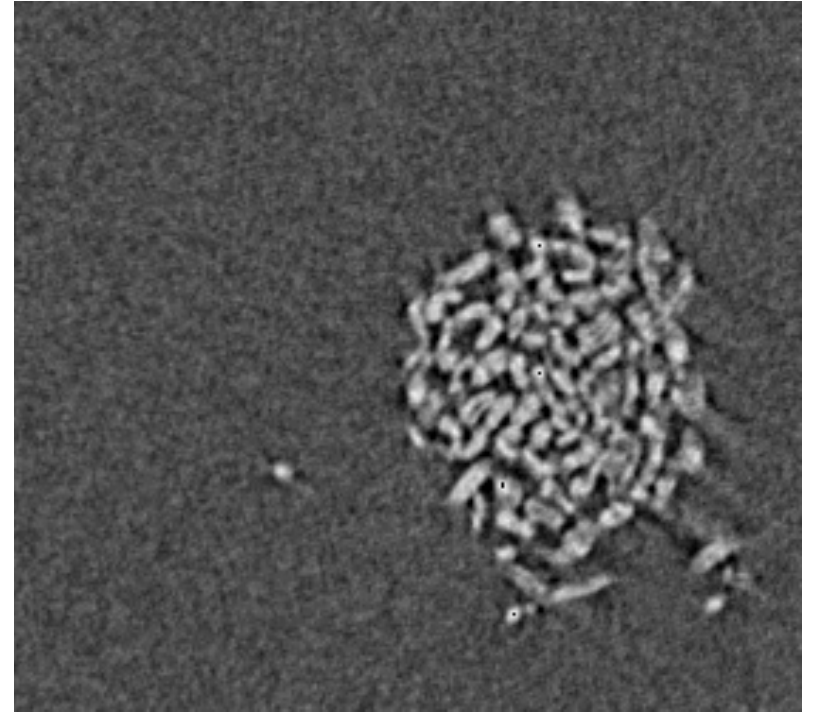


Vertical field of view
(mm)



Helical micro CT scanning

System: ANU in house built
Facility: Australian National University
Energy: 60 Kev
Mag: 110.68x



Scanning voxel size 1.3
(Microns)

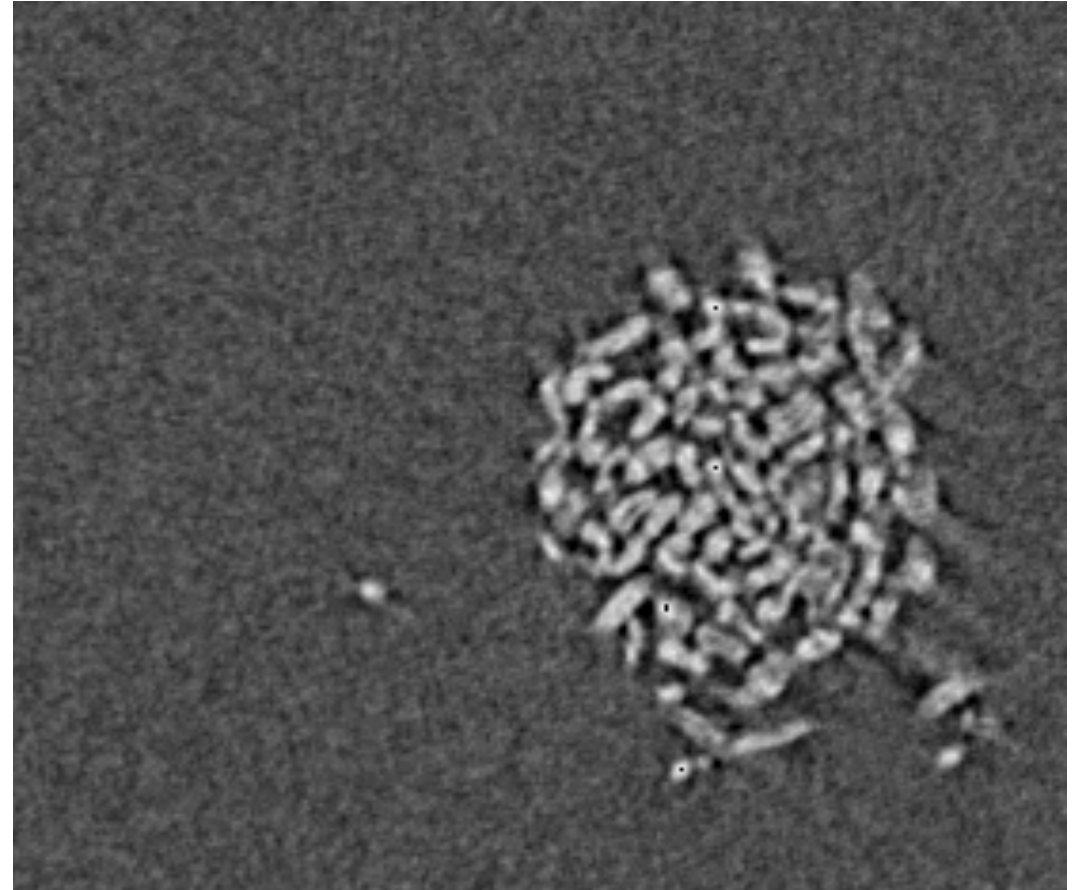
Vertical field of view **16**
(mm)

Data analysis

Information of interest:

Distribution of fibres within yarn CS in terms of yarn diameter, packing density, radial packing density, yarn shape etc.

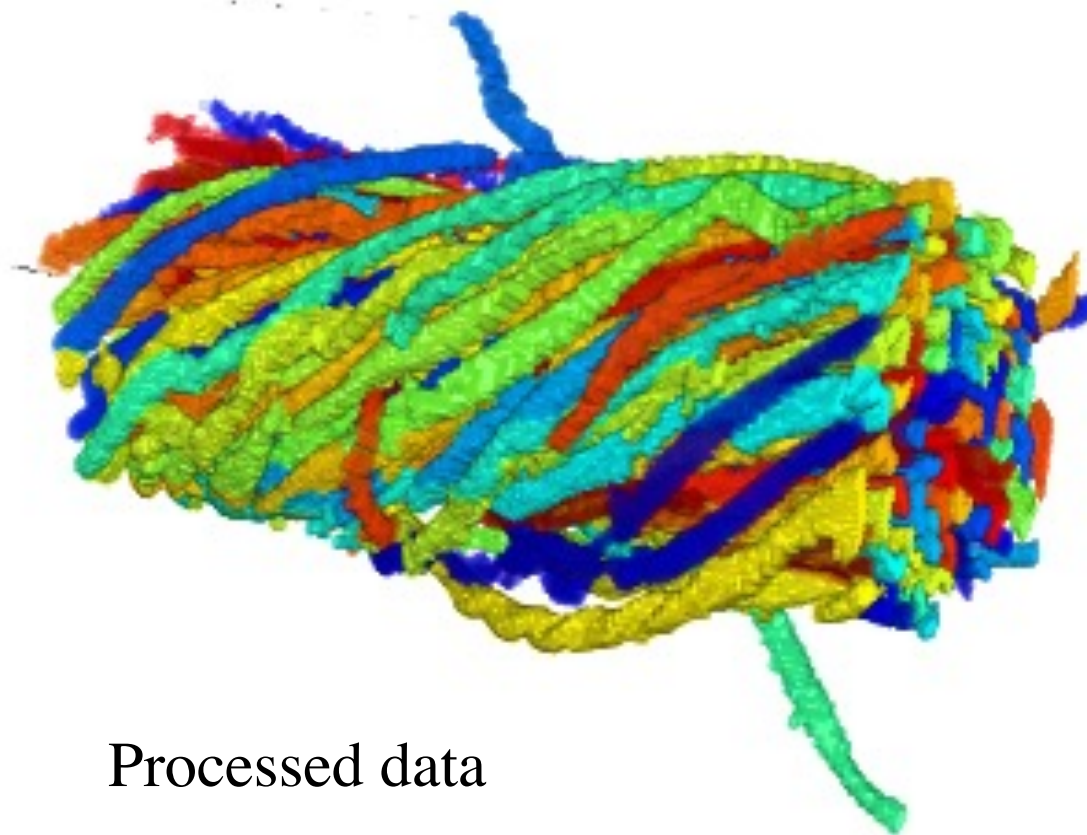
Tracking fibres along yarn length to measure fibre migration, angles, orientation



CT image / data analysis



Raw data



Processed data

Conclusions

- Textile yarn structure
 - Stronger yarns have possess higher rate of radial disposition of fibres
 - Increased inter fibre entanglement
 - Higher inter fibre friction
 - Higher yarn strength

Conclusions

- Micro CT data analysis side
 - Ratio of information present in CT images to information usually extracted is usually not encouraging
 - Significant potential of improvement in terms of accuracy and effectiveness
 - Quantification of information of interest in terms of suitable parameters (discipline specific) is difficult to achieve
 - Commercial software licenses are quite expensive
 - Analysis and visualization of CT datasets require intensive computing resources

Thank you

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