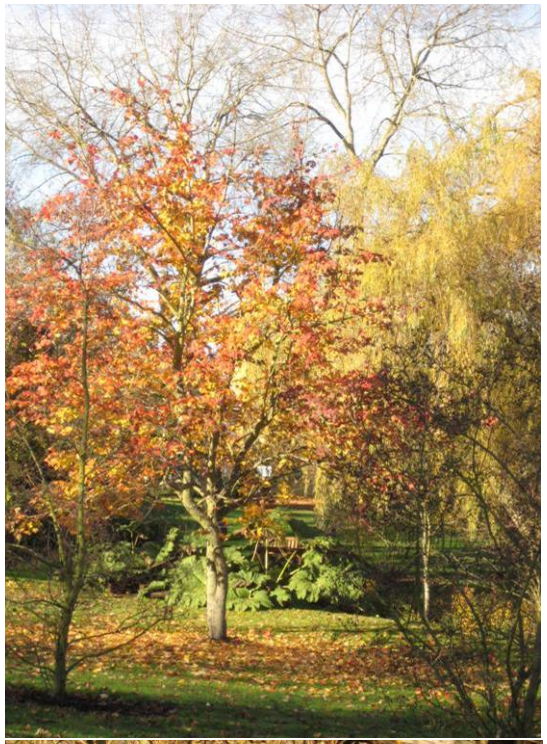
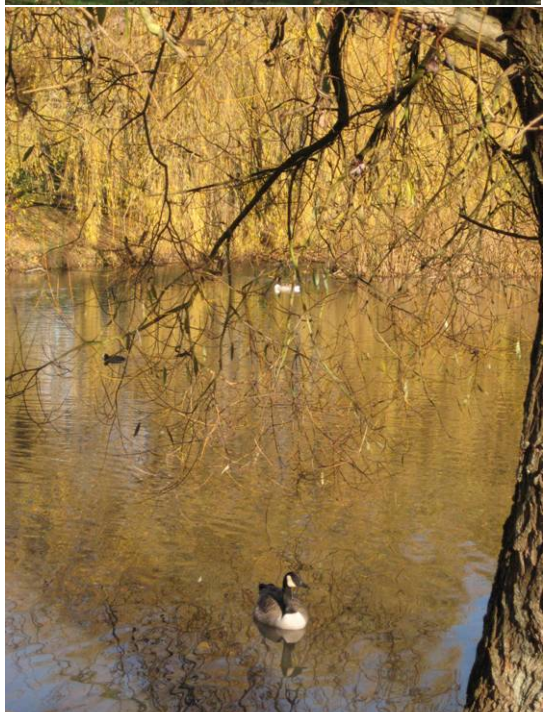




UNIVERSITY OF SURREY
Ion Beam Centre

R-matrix Mini-school

Centre for Nuclear and Radiation Physics
Department of Physics, University of Surrey
Thursday, 9th May 2013, 9 am

Ed Simpson & Jeff Tostevin

Department of Physics, University of Surrey

Alex Gurbich, Chris Jeynes & Julien Colaux

University of Surrey Ion Beam Centre

www.surreyibc.ac.uk

R-matrix Mini-school Programme

UNIVERSITY OF SURREY
Ion Beam Centre

Thursday May 9th 2013 - Room 30BB03

9.00 - 9.10	Arrival and Welcome:	Dr Chris Jeynes (Surrey)
9.10 - 10.20	*What is the R-matrix?*	Prof Jeff Tostevin (Surrey)
10.20 - 11.00	Coffee Break	
11.00 - 12.00	*Leverhulme Lectures I & II:*	Prof Alexander Gurbich (Surrey/Obninsk)
	Lecture I: Nuclear data for Ion Beam Analysis (IBA)	
	Lecture II: The evaluation of charged particles low energy reaction cross-sections	
12.00 - 13.00	*Astrophysics needs and tools: Overview of AZURE*:	Dr Ed Simpson (Surrey)
13.00 - 14.00	Lunch/discussions	
14.00 - 18.00	*Hands-on session* Computer Laboratory (10BC03):	Dr Ed Simpson (Surrey)

Friday May 10th 2013 - Room 30BB03

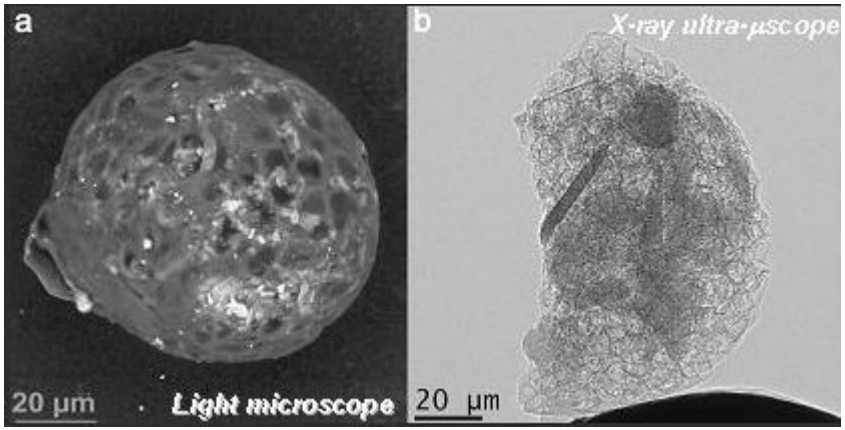
9.00 - 9.30	*UK nuclear measurements capability: The Surrey Facility*:	Dr Julien Colaux (Surrey)
9.30 - 10.30	*Leverhulme Lecture III: Similarities between nuclear data for IBA and Astrophysics*	Prof Alexander Gurbich (Surrey/Obninsk)
10.30 - 11.30	Tour of the Surrey Ion Beam Centre and Coffee Break	
11.30 - 13.00	*The Application of R-Matrix analysis to experimental data (topical applications)*	
	1 - Resonance Properties:	Dr Alex Murphy (Edinburgh)
	2 - Reaction Rates:	Prof Alison Laird (York)
	3 - Evaluation of Si(α,α)Si:	Dr Chris Jeynes (Surrey)
13.00 - 14.00	Lunch/discussion	
14.00 - (18.00)	*Hands-on session* Computer Laboratory (10BC03) :	Dr Ed Simpson (Surrey)
16.00	**Formal Close**	

PIXE/EBS of Darwin glass

UNIVERSITY OF SURREY
Ion Beam Centre

Bailey, Howard, Jeynes, Kirkby, Nucl. Instrum. Methods B267 2219-2224 (2009)

See also Lo, Howard ++ Meteoritics & Planetary Science 37 (2002) 1555-1562
Howard & Haines, Earth & Planetary Science Lett. 260 (2007) 328-339

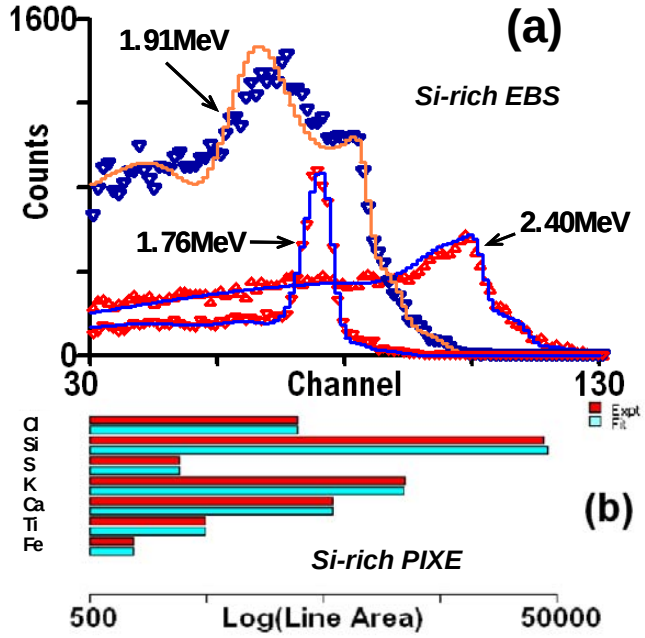


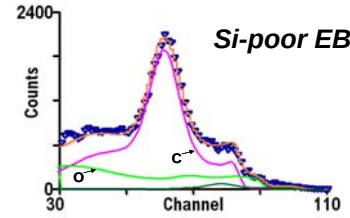
Impact glass from 800,000 year old meteor strike crater at Mt.Darwin, Tasmania

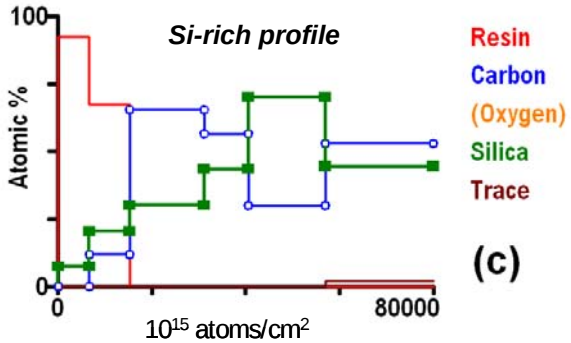
Inclusions are :-
- carbonaceous:
- silicon-rich: PIXE
- highly heterogeneous:

confirmed by :-
→ EBS resonance ←

silica observed through effect of straggling on
→ EBS resonance ←





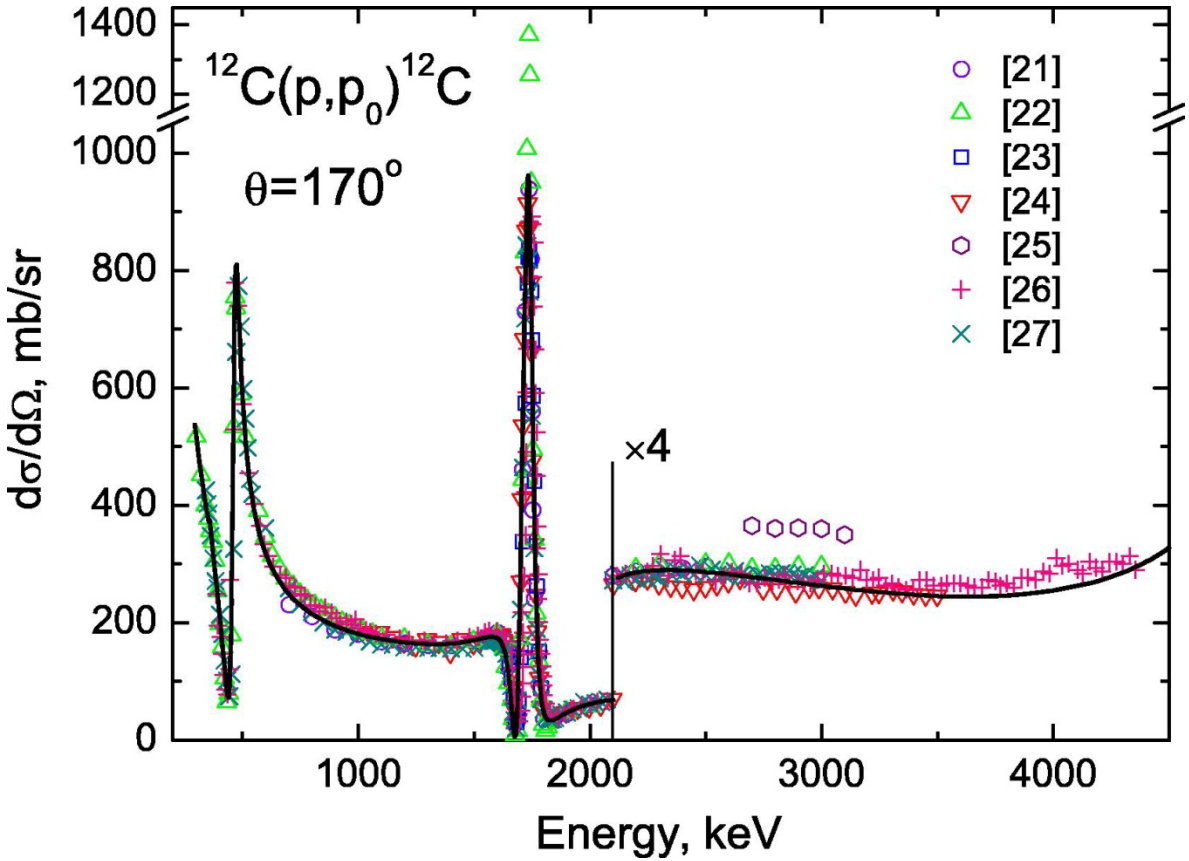


Silica (quartz by XRD) not quantifiable without PIXE. Unequivocal profiling down to ~15μm with EBS

www.surreyibc.ac.uk

Elastic scattering cross-sections

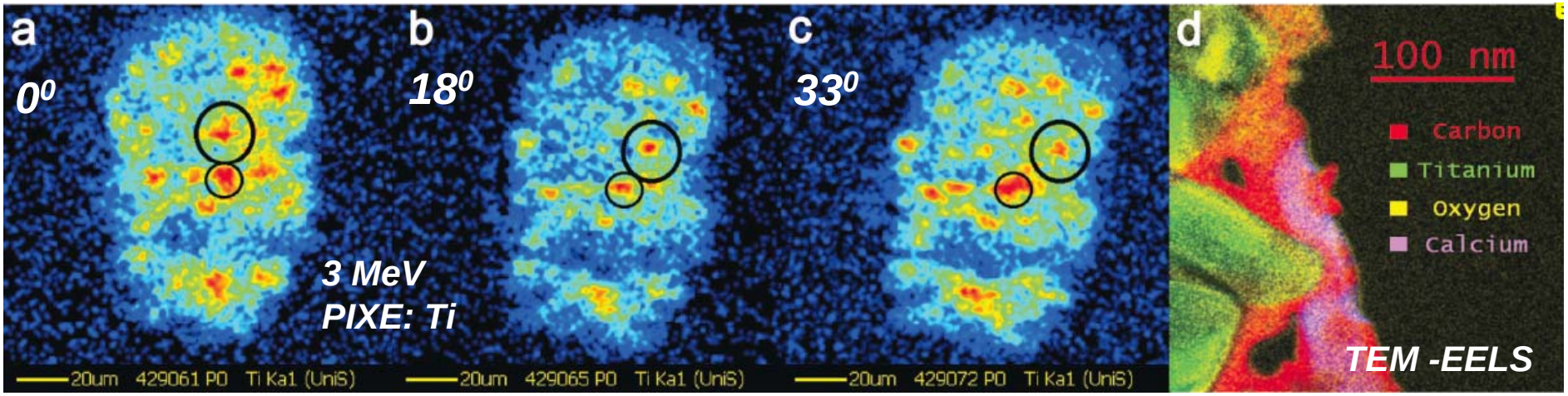
UNIVERSITY OF SURREY
Ion Beam Centre

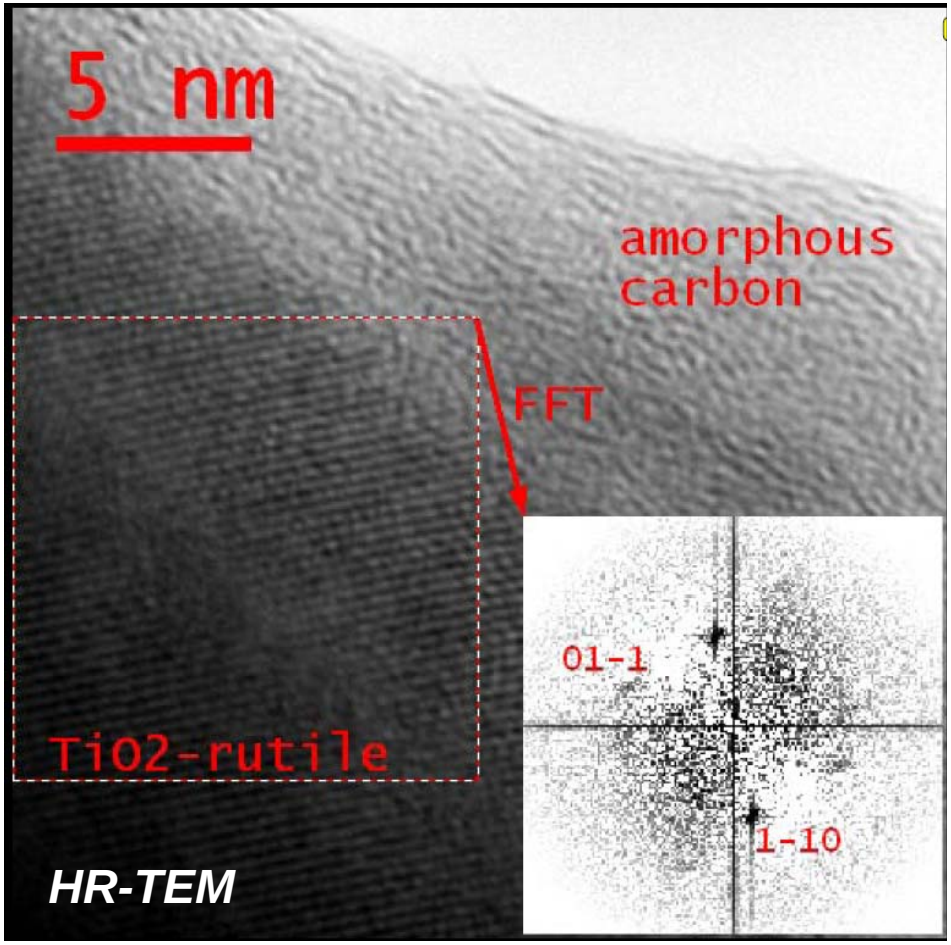


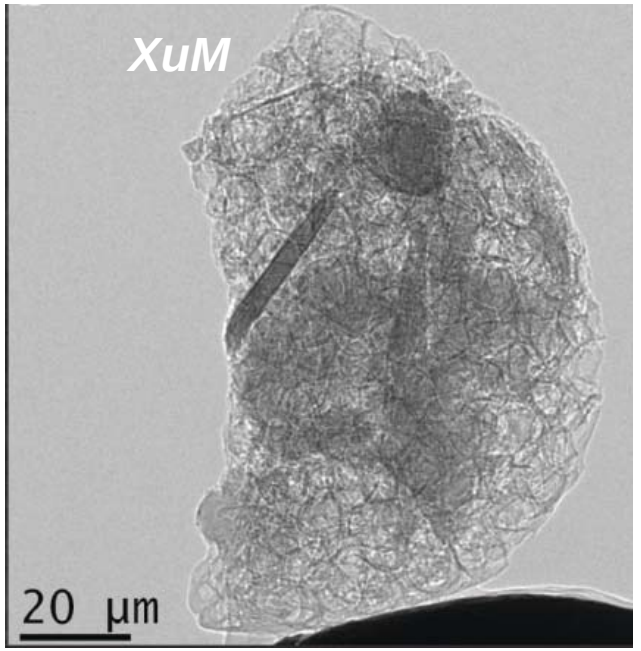
A.F.Gurbich, Evaluated differential cross-sections for IBA, Nucl. Instrum. Methods B, 268 (2010) 1703-1710

See also Gurbich Nucl. Instrum. Methods B, 136–138 (1998) 60–65

Abriola, Gurbich ++ Nucl. Instrum. Methods B, 269 (2011) 183-186







XuM: X-ray ultra-microscope

X-ray tomography with ultra-focussing for high spacial resolution

TEM ++

Inclusion in a Darwin impact glass: Ti micro-inclusions

The fate of organic carbon during meteorite impact:
Kieren Howard, Melanie Bailey, Chris Jeynes, Vlad Stolojan et al, in preparation