

# SET-319/RSM New Mathematics for Multi-Dimensional Radar Systems

Tuesday 21 – Thursday 23 Feb 2023

## Meeting Programme

 **Isaac Newton Institute**  
for Mathematical Sciences  **Newton Gateway**  
to Mathematics



Tuesday 21 February 2023	
11.00	Enrollment opens
12.00 – 13.00	Enrollment and Lunch on arrival
13.00 – 13.10	<b>Opening Session:</b> Opening Remarks - Chair
13.10 – 13.20	<b>Opening Session:</b> Isaac Newton Institute and the Newton Gateway to Mathematics - C. Merritt
13.20 – 13.30	<b>Opening Session:</b> NATO CSO, SET Panel - SET Panel Vice -Chair
13.30 – 14.10	<b>Keynote speech #1</b> <b>A. Farina</b> - <i>Operational needs and open technical problems in multi-dimensional radar</i>
14.10 – 14.30	<b>Session #1 - Imaging I</b> <b>D. Andre</b> - <i>Ground-Based SAR Laboratory Investigation of Multistatic SAR sensing</i>
14.30 – 14.50	<b>Session #1 - Imaging I</b> <b>A. Curtis</b> (Newton Gateway keynote) - <i>Imaging with uncertainty - a seismic perspective</i>
14.50 – 15.30	Coffee Break/discussion
15.30 – 15.50	<b>Session #2 - Imaging II</b> <b>S. Çamlica</b> - <i>Off-grid compressive sensing for SAR</i>
15.50 – 16.10	<b>Session #2 - Imaging II</b> <b>S. Holman</b> - <i>Microlocal Analysis in SAR</i>
16.10 – 16.30	<b>Session #2 - Imaging II</b> <b>J. Hellier/E. Cooper</b> - <i>Spectral Postprocessing Techniques for Synthetic Aperture Radar</i>
16.30 – 17.00	<b>Breakout Discussions</b>
17.00 - 18.00	End of Day #1 and hosted Wine Reception at ICMS

Wednesday 22 February 2023	
09.30 - 10.10	<b>Keynote speech #2</b> <b>W. Parnell and I.D. Abrahams</b> - <i>Multiple scattering beyond the Born approximation</i>
10.10 – 10.30	<b>Session #3 - Phenomenology and Multistatic radar</b> <b>M. Burfeindt</b> - <i>Phase-encoded qualitative inverse scattering approaches to multistatic synthetic aperture imaging</i>
10.30 – 10.50	<b>Session #3 - Phenomenology and Multistatic radar</b> <b>P. Ledger</b> - <i>Polarizability tensors for object characterisation beyond the eddy current limit</i>
10.50 – 11.10	<b>Session #3 - Phenomenology and Multistatic radar</b> <b>T. Pelham</b> - <i>Flexible Radar Channel Model for Multi-Dimensional Radar</i>
11.10 – 11.30	Coffee Break/Discussion
11.30 - 11.50	<b>Session #4 - Imaging III</b> <b>D. Bonicoli</b> - <i>Extension of 2D-OMP algorithm to Full Polarimetric ISAR Imaging</i>
11.50 – 12.10	<b>Session #4 - Imaging III</b> <b>E. Pasca</b> - <i>Non smooth optimisation for tomographic imaging with The Core Imaging Library</i>
12.10 – 12.30	<b>Session #4 - Imaging III</b> <b>K. Tant</b> (Newton Gateway keynote) - <i>Traveltime Tomography of Locally Anisotropic Media Using Stein Variational Gradient Descent</i>
12.30 – 13.30	Lunch/discussion

13.30 – 13.50	<b>Session #5 - Signal Processing</b> T. Feuillen - <i>Unlimited Sampling for FMCW Radars: A Proof of Concept</i>
13.50 – 14.10	<b>Session #5 - Signal Processing</b> C. Mitchell (Newton Gateway keynote) - <i>Mathematical challenges in HF radar target geolocation</i>
14.10 – 14.30	<b>Session #5 - Signal Processing</b> W.-s. Lee - <i>Breaking the curse of dimensionality in exponential analysis</i>
14.30 – 14.50	<b>Session #5 - Signal Processing</b> M. Boddi - <i>DoA estimation in Uniform Circular Arrays under unknown antenna coupling conditions</i>
14.50 – 15.00	Coffee Break
15.00 – 15.20	<b>Session #6 – Challenges</b> B. Hopson (Leonardo)- <i>Challenges exploiting fully-digitised multi-function arrays</i>
15.20 – 15.40	<b>Session #6 – Challenges</b> B. Lionheart (Newton Gateway keynote) - <i>Multistatic radar - a mathematical challenge perspective</i>
15.40 – 16.40	<b>Breakout discussions on challenges</b>
16.40 – 17.00	<b>Groups report back</b>
17.00	End of Day #2
19.00	<b>Conference dinner at Blonde</b>

Thursday 23 February 2023	
09.30 - 10.10	<b>Keynote speech #3</b> E. Giusti - <i>Multi-dimensional radar imaging</i>
10.10 – 10.30	<b>Session #7 - Imaging IV</b> M. Betcke - <i>Learning the Invisible in PAT</i>
10.30 – 10.50	<b>Session #7 - Imaging IV</b> A. Giannopoulos - <i>Full-waveform inversion for ground penetrating radar via ensemble Kalman inversion</i>
10.50 – 11.30	Coffee Break/Breakout session
11.30 – 11.50	<b>Session #8 - Multistatic Radar</b> V. Carotenuto - <i>Homogeneity Tests and Covariance Matrix Structure Classification of Multistatic/Polarimetric Sea-Clutter Data</i>
11.50 – 12.10	<b>Session #8 - Multistatic Radar</b> M.P. Jarabo-Amores - <i>Machine learning based solutions for highly demanding detection requirements defined by new radar technologies and threats</i>
12.10 – 12.30	<b>Session #8 - Multistatic Radar</b> M. Baczyk - <i>Autofocus methods for multistatic radars</i>
12.30 - 13.30	Lunch/Discussion
13.30 – 14.15	<b>Round-the-table discussion</b>
14.15 – 14.30	Concluding Remarks - D. Blacknell (TER)
14.30	<b>Specialist Meeting Closure</b>