



Institute of
mathematics
& its applications

3rd IMA Conference on Inverse Problems from Theory to Application

International Centre for Mathematical Sciences
(ICMS), Edinburgh

3 – 5 May 2022

CONFERENCE PROGRAMME



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Notes: each contributed oral session has 3 speakers, talks last 20 minutes (questions included). The poster sessions have 16 posters combined (8 posters per session).

Day One - Tuesday 3rd May 2022

10.15	Welcome, Introduction and Housekeeping	
10.30	Plenary 1 - Thomas Pock, Learning Consistent Discretizations of the Total Variation - Room 5.10	
11.30	Contributed session 1 (in parallel) Room G.03 • <i>Bayesian Inference with Neural Networks As Data Driven Generative Priors – Matthew Holden</i> • <i>Deep Learning – accelerated Bayesian inference of our Universe – Dr Alessio Spurio Mancini</i>	Contributed session 2 (in parallel) Room 5.10 • <i>Inverse Problem of aerosol property retrieval from light scattering measurements – Romana Boiger</i> • <i>Metal object characterisation using harmonic generalised polarization tensors and symmetry groups – Prof William Robert Breckon Lionheart</i> • <i>Characterisation and Classification of Metallic Threat Objects for Security Screening – Dr Paul David Ledger</i>
12.30	Lunch & Networking	
14.00	Invited Speaker - Luca Calatroni, Seeing through light: sparse and learning methods for super-resolution fluorescence microscopy - Room 5.10	
15.00	Contributed session 3 (in parallel) Room G.03	Contributed session 4 (in parallel) Room 5.10

	<i>Unifying convergence analysis for degenerate preconditioned proximal point algorithms – Emanuele Naldi</i> <i>SGD in Banach spaces – Zeljko Kereta</i>	<i>Inverse problems in tomography – from theory to practice – Tristan van Leeuwen</i> <i>Photoacoustic and Ultrasonic Tomography for Breast Cancer Imaging – Felix Lucka</i> <i>On the Frequentist Accuracy of Bayesian Uncertainty Quantification Procedures in Inverse problems in Imaging, David Thong</i>
16.00	Drinks Reception, Networking & Poster Sessions	
	<i>Poster sessions 1 (in parallel)</i>	<i>Poster sessions 2 (in parallel)</i>
	<i>Palamodov Inversion for Bistatic Synthetic Aperture Radar (SAR) – Dr Sean Holman</i> <i>Adaptive Undersampling in Spectromicroscopy – Oliver Townsend</i> <i>Challenges of dynamic data: MPI reconstruction with motion estimation – Lena Zdun</i> <i>Rich and Non-linear Inverse Problems in SAR – Dr Francis Maurice Watson</i> <i>Artifact Reduction for Magnetic Particle Imaging with an FFL-Scanner and Dynamic Particle Concentrations - Stephanie Blanke</i> <i>A Bayesian Level Set Method for Identifying Subsurface Structures in Stokes Flow – Lukas Holbach</i> <i>Inclusion detection for the Bayesian EIT problem – Aksel Rasmussen</i> <i>Stability for a special class of anisotropic conductivities via an ad-hoc misfit functional – Mrs Sonia Foschiatti</i>	<i>Deep Composition of Tensor-Trains Using Squared Inverse Rosenblatt Transports – Sergey Dolgov</i> <i>Dual forward-backward unfolded network for Flexible Plug-and-Play – Audrey Repetti</i> <i>Regularization via deep generative models: an analysis point of view – Thomas Oberlin</i> <i>Learning the Regularisation Parameter for Inverse Problems – Seb Scott</i> <i>Deep Neural Networks for Ground Penetrating Radar in Landmine Detection – Daniel Ball</i> <i>Diverse image super-resolution with hierarchical variational autoencoders – Jean Prost</i> <i>Bistatic two dimensional synthetic aperture radar as a tensor tomography problem – Mr Oliver Thomas Graham</i>
17.30	Conference Ends	

Day Two - Wednesday 4th May 2022

09.00	Invited Speaker - Gabriele Steidl, Stochastic Normalizing Flows and the Power of Patches in Inverse Problems - Room 5.10	
10.00	<i>Contributed session 5 (in parallel) Room G.03</i>	<i>Contributed session 6 (in parallel) room 5.10</i>
	<i>Lifted Bregman Networks – Xiaoyu Wang</i> <i>A Mathematically Tractable Deep Generative Model for Inverse Problems – Andreas Habring</i> <i>Sensor Optimisation in Seismic Imaging via Bilevel Learning – Ms Shaunagh Downing</i>	<i>Tomography of the fast-ion velocity distribution in tokamak plasmas with a physics-based prior – Prof Per Christian Hansen</i> <i>Magnetic Resonance Electrical Impedance Tomography with incomplete data – Kim Knudsen</i>

		• <i>Multiple Object In-Line X-ray Tomography with Overlapping Projections - Dirk Schut</i>
11.00	Coffee Break & Networking	
11.30	Contributed session 7 (in parallel) Room G.03 • <i>Posterior Sampling with AutoEncoding Prior – Andrés Almansa</i> • <i>Gradient Step Denoiser for convergent Plug-and-Play – Samuel Hurault</i> • <i>Bayesian imaging using Plug-and-Play priors: when Langevin meets Tweedie - Rémi Laumont</i>	Contributed session 8 (in parallel) Room 5.10 • <i>Cosmological mass-mapping with trans-dimensional trees – Augustin Marignier</i> • <i>Source Separation for gravitational waves using representation learning – Elie Leroy</i> • <i>Learned methods for image reconstruction in interferometric imaging with the SPIDER instrument – Matthijs Mars</i>
12.30	Lunch & Networking break @ Bayes	
14.00	Invited Speaker - Yi Yu, Detecting and localising changes in complex environments – Room 5.10	
15.00	Contributed session 9 (in parallel) Room G.03 • <i>Learned operator correction in inverse problems – Andreas Hauptmann</i> • <i>Scalable high precision computational imaging with learned priors – Matthieu Terris</i> • <i>Imposing measurement consistency in Deep Neural Networks for Inverse Problems via Optimization Layer and End-to-End training – Rahul Mourya</i>	Contributed session 10 (in parallel) Room 5.10 • <i>Dynamic Tomography Regularization with Sparse 4D Representation Systems – Tommi Heikkilä</i> • <i>Comparing optimal control to physics-informed neural networks for PDE-constrained parameter identification with MRI data – Bastian Zapf</i> • <i>Analytical inversion formula of a Radon transform on circle arcs arising in a modality of Compton Scattering Tomography with tra – Cecilia Tarpau</i>
16.00	Coffee Break & Networking	
16.30	Poster sessions 1 (in parallel) • <i>Palamodov Inversion for Bistatic Synthetic Aperture Radar (SAR) – Dr Sean Holman</i> • <i>Adaptive Undersampling in Spectromicroscopy – Oliver Townsend</i> • <i>Challenges of dynamic data: MPI reconstruction with motion estimation – Lena Zdun</i> • <i>Rich and Non-linear Inverse Problems in SAR – Dr Francis Maurice Watson</i> • <i>Artifact Reduction for Magnetic Particle Imaging with an FFL-Scanner and Dynamic Particle Concentrations - Stephanie Blanke</i> • <i>A Bayesian Level Set Method for Identifying Subsurface Structures in Stokes Flow – Lukas Holbach</i> • <i>Inclusion detection for the Bayesian EIT problem – Aksel Rasmussen</i>	Poster sessions 2 (in parallel) • <i>Deep Composition of Tensor-Trains Using Squared Inverse Rosenblatt Transports – Sergey Dolgov</i> • <i>Dual forward-backward unfolded network for Flexible Plug-and-Play – Audrey Repetti</i> • <i>Regularization via deep generative models: an analysis point of view – Thomas Oberlin</i> • <i>Learning the Regularisation Parameter for Inverse Problems – Seb Scott</i> • <i>Deep Neural Networks for Ground Penetrating Radar in Landmine Detection – Daniel Ball</i> • <i>Diverse image super-resolution with hierarchical variational autoencoders – Jean Prost</i> • <i>Bistatic two dimensional synthetic aperture radar as a tensor tomography problem – Mr Oliver Thomas Graham</i>

	<i>Stability for a special class of anisotropic conductivities via an ad-hoc misfit functional – Mrs Sonia Foschiatti</i>	
19.00	Conference Dinner & Networking – Apex Grassmarket Hotel	

Day Three - Thursday 5th May 2022

09.00	Plenary 5 - Jason McEwen, Bayesian model selection in cosmology and astrophysics - Room 5.10	
10.00	<i>Contributed session 11 (in parallel) Room G.03</i> <i>Non-blind single-image super-resolution with spatially-varying blur using deep unfolding networks – Charles Laroche</i> <i>Hyperspectral super-resolution accounting for spectral variability: coupled tensor LL1-based recovery and blind unmixing of the – Clémence Prévost</i> <i>On dimension reduction and exact recovery for dynamic spike super resolution – Martin Holler</i>	<i>Contributed session 12 (in parallel) Room 5.10</i> <i>A Hessian-Free Mirror Langevin Algorithm with Applications to Sparse Regression - Lorenz Kuger</i> <i>Sampler algorithm for non-convex inverse problem – Pierre Palud</i> <i>Distributed sampling for imaging inverse problems in high dimension - Pierre-Antoine Thouvenin</i>
11.00	Coffee break & Networking	
11.30	<i>Contributed session 13 (in parallel) Room G.03</i> <i>Accelerating markov chain monte carlo methods for bayesian imaging – Mr Luis Andrés Vargas</i> <i>Regularising Inverse Imaging Problems Using Generative Machine Learning Models – Margaret Duff</i> <i>SDE-based MCMC methods for low-photon imaging inverse problems – Mr Savvas Melidonis</i>	<i>Contributed session 14 (in parallel) Room 5.10</i> <i>Proximal Iterated Extended Kalman Smoother for regularised non-linear models – Johanna Järvsoo</i> <i>Black box variational inference for Bayesian inverse problems with complex forward models – Gil Robalo Rei.</i> <i>Empirical Bayesian estimation for semi-blind inverse problems: Application to image deblurring with total variation regularisation – Charlesquin Kemajou Mbakam</i>
12.30	Lunch & Networking	
14.00	Plenary 6 - Andrew Duncan, Ensemble Inference Methods for Models with Noisy and Expensive Likelihoods - Room 5.10	
15.00	<i>Contributed session 15 (in parallel) Room G.03</i> <i>Determination of thermal properties of biological tissues – Prof Daniel Lesnic</i> <i>A computational approach to link cell history with cell fate at the single level – Jessica Forsyth</i>	<i>Contributed sessions 16 (in parallel) Room 5.10</i> <i>Jacobian of solutions to the conductivity equation in limited view – Hjørdis Schlüter</i> <i>The Henderson problem and the relative entropy functional in the thermodynamical limit F – Fabio</i>

	<i>Joint reconstruction, motion estimation and segmentation of the dynamic foot and ankle problem -Nargiza Djurabekova</i>	<i>Frommer</i> <i>Fast Task-Based Adaptive Sampling for 3D Single-Photon Multispectral Lidar Data – Amir Belmekki</i>
16.00	End of conference	