

2015 BASP Frontiers Workshop

International Workshop on
Biomedical & Astronomical Signal Processing



January 25 - 30, 2015
www.basppfrontiers.org

Chair

Prof. Yves Wiaux Heriot-Watt University, UK

Area Chairs

Prof. Yves Wiaux Heriot-Watt University, UK

Prof. Jason McEwen University College London, UK

Prof. Michael Lustig UC Berkeley, USA

Session Organisers

Signal processing

Prof. Pier Luigi Dragotti Imperial College London, UK

Prof. David Dunson Duke University, USA

Prof. Peter Richtarik University of Edinburgh, UK

Astro-imaging

Prof. Alan Heavens Imperial College London, UK

Prof. Thomas Kitching University College London, UK

Prof. Hiranya Peiris University College London, UK

Prof. Oleg Smirnov Rhodes University, ZA

Bio-imaging

Prof. Guang-Hong Chen University of Wisconsin, USA

Prof. Chunlei Liu Duke University, USA

Prof. Nicole Seiberlich Case Western, USA

Prof. Shreyas Vasanawala Stanford University, USA

Logistics

Dr. Rafael Carrillo	EPFL, Switzerland
Mrs. Rosie De Pietro	EPFL, Switzerland
Mr. Sean Farrell	Heriot-Watt University, UK
Mr. Vijay Kartik	EPFL, Switzerland
Dr. Boris Leistedt	University College London, UK
Dr. Gilles Puy	INRIA, France
Mrs. Lynn Smith	Heriot-Watt University, UK
Prof. Jean-Philippe Thiran	EPFL, Switzerland

Venue

Hotel du Golf & Spa
1884 Villars-sur-Ollon
Switzerland
+41 24 496 38 38
www.hoteldugolf.ch

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Sunday afternoon, January 25th

13.00 — 14.00

Aperitif and standing lunch

14.00 — 15.45

Free time

15.45 — 16.00

Workshop opening

16.00 — 17.00

Conference introduction talk

Prof. Anthony Lasenby

The Search for Gravitational Waves in the Early Universe

17.00 — 17.30

Coffee

Sunday evening, January 25th

17.30 — 19.45

Successes and Opportunities in Medical Imaging

Chair: Prof. Shreyas Vasanaawala

17:30 Keynote	S. Vasanaawala	Quantification in Cardiovascular MRI
18:05	G. Kicska	Digital Chest Tomosynthesis: Clinical Applications and Technical Obstacles
18:30	C. Hennemeyer	Coming Challenges in Medical Device Development
18:55	P. Ghanouni	MR Guided High Intensity Focused Ultrasound
19:20	M. Holler	ICTGV regularization for image sequence reconstruction of accelerated dynamic MRI

19.45

Deluxe posters and aperitif

19:45	S. Cauley	Hierarchically Semiseparable Generalized Encoding Matrix Compression for Fast Inverse Imaging
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20.45 : Dinner

Monday morning, January 26th

8.00 — 10.15

Signal Processing in Cosmology

Chairs: Profs. Hiranya Peiris and Thomas Kitching

08:00 Keynote	B. Wandelt	3-D, physical image reconstruction in cosmology
08:35	A. Heavens	Standard rulers, candles and clocks: measuring the BAO scale model-independently.
09:00	B. Leistedt	Analysing the polarisation of the CMB with spin scale-discretised wavelets
09:25	R. Tojeiro	Surveying the Universe - the past, present and future of galaxy redshift surveys.
09:50	R. Trotta	Bayesian hierarchical models for supernova cosmology

10.15

Deluxe posters and coffee

10:15	P. Hurley	Gridding by Beamforming
10:15	V. Kartik	Dimension embedding for big data in radio interferometry
10:15	I. Harrison	Challenges in Radio Weak Gravitational Lensing

Monday evening, January 26th

17.30 — 19.45

Sparsity 2.0: New Trends in Sparse Approximation, Sparsity-based Signal Models and Algorithms

Chair: Prof. Pier Luigi Dragotti

17:30 Keynote	A. Gilbert	Sparse Approximation, List Decoding, and Uncertainty Principles
18:05	M. Elad	SOS Boosting of Image Denoising Algorithms
18:30	M. Davies	Compressed Quantitative MRI using BLIP
18:55	M. Rodrigues	Compressed Sensing with Prior Information: Theory and Practice
19:20	P. L. Dragotti	A ProSparse Approach to find the Sparse Representation in Fourier and Canonical Bases

19.45

Deluxe posters and aperitif

19:45	H. Pan	Annihilation-driven Image Edge Localization
19:45	J. Oñativia	Sparsity According to Prony: From Structured to Unstructured Representations and Back
19:45	E. Magli	Fast IRLS for sparse reconstruction based on gaussian mixtures
19:45	J. Masci	Sparse similarity-preserving hashing

20.45 : Dinner

Tuesday morning, January 27th

8.00 — 10.15

Neuro and Quantitative Imaging

Chair: Prof. Chunlei Liu

08:00 Keynote	P. Basser	Opportunities and Challenges in Brain Mapping with Diffusion MRI
08:35	J. Reichenbach	MR Susceptibility Imaging and Mapping
09:00	K. Setsompop	Wave-CAIPI for an order of magnitude acceleration in MRI acquisition
09:25	S. Equis	4D in Bio-microscopy: Marker-free Live Cell Tomography
09:50	K. Nightingale	Quantitative Elasticity Imaging With Acoustic Radiation Force: Methods and Clinical Applications

10.15

Deluxe posters and coffee

10:15	C. Tax	Towards Quantification of the Brain's Sheet Structure in Diffusion MRI Data
10:15	N. Shemesh	Cellular microstructures revealed by Non-Uniform Oscillating-Gradient Spin-Echo (NOGSE) MRI
10:15	N. Ben-Eliezer	Non-Analytic Model-Based Reconstruction for Accelerated Multiparametric Mapping in MRI

Tuesday evening, January 27th

17.30 — 19.45

Radio interferometric deconvolution and imaging techniques, from CLEAN to CS to Bayesian

Chair: Prof. Oleg Smirnov

17:30 Keynote	A. Offringa	Radio interferometric imaging for the SKA and its pathfinders
18:05	R. Carrillo	Why CLEAN when you can PURIFY? A new approach for next-generation radio-interferometric imaging
18:30	J.-L. Starck	LOFAR and SKA Sparse Image Reconstruction
18:55	H. Junklewitz	RESOLVE: A new algorithm for aperture synthesis imaging of extended emission
19:20	A. Dabbech	MORESANE: a sparse deconvolution algorithm for radio interferometric imaging

19.45

Deluxe posters and aperitif

19:45	O. Smirnov	The Malta-imager: A new high-performance imaging tool
19:45	O. Smirnov	Accelerated facet-based widefield imaging
19:45	L. Schwardt	Fast Phase Transition Estimation
19:45	J. Kenyon	PyMORESANE: Pythonic and CUDA-accelerated implementations of MORESANE
19:45	M. Kuhlmann	Imaging Uncertainty in Radio Interferometry

20.30 : Workshop picture and Dinner

Wednesday morning, January 28

8.00 — 10.15

Modern Scalable Algorithms for Convex Optimization

Chair: Prof. Amir Beck

08:00 Keynote	J.-C. Pesquet	Proximal Primal-Dual Optimization Methods
08:35	C. Schönlieb	Optimising the optimisers - image reconstruction by bilevel optimisation
09:00	A. Beck	On the Convergence of Alternating Minimization with Applications to Iteratively Reweighted Least Squares and Decomposition Schemes
09:25	J. Konecny	Semi-Stochastic Gradient Descent Methods
09:50	J. Mairal	Incremental and Stochastic Majorization-Minimization Algorithms

10.15

Deluxe posters and coffee

10:15	Q. Tran-Dinh	A Primal-Dual Algorithmic Framework for Constrained Convex Optimization
10:15	A. Pirayre	Discrete vs Continuous Optimization for Gene Regulatory Network Inference
10:15	V. Kalofolias	Enhanced matrix completion with manifold learning
10:15	M. Yaghoobi	Non-Negative Orthogonal Matching Pursuit

Wednesday evening, January 28

17.30 — 19.45

Rapid and Multidimensional Imaging

Chairs: Profs. Nicole Seiberlich and Guang-Hong Chen

17:30 Keynote	Z.-P. Liang	Multidimensional Imaging: A Path to High Resolution and High Speed through Subspaces Low-rank plus sparse dynamic MRI: separation of background and dynamic components and self discovery of motion
18:05	R. Otazo	Magnetic Resonance Fingerprinting: Beyond Parameter Mapping to Clinical Application
18:30	N. Seiberlich	More is indeed different
18:55	G.-H. Chen	Imaging with X-ray Modulated Nanoparticles
19:20	G. Wang	

19.45

Deluxe posters and aperitif

19:45	J. C. Ye	Semi-Analytic Iterative Framework for TV Penalized Cone-beam CT Reconstruction
19:45	K. Layton	Spatial encoding with generalised magnetic field shapes

20.45 : Dinner

Thursday morning, January 29th

8.00 — 10.15

Astrostatistics: Bayes and machines

Chairs: Prof. Alan Heavens

08:00 Keynote	M. Hobson	Neural networks and accelerated Bayesian inference
08:35	M. Kunz	Bayesian Inference for Radio Observations
09:00	T. Kitching	Weak Gravitational Lensing
09:25	A. Robotham	Optimal deblending and stacking across multi-band surveys using LAMBDAR
09:50	E. Cameron	On functional regression-based emulators for faster Bayesian inference from computational simulations

10.15

Deluxe posters and coffee

10:15	A. Heavens	Astrostatistics and Brain Imaging
10:15	R. Jimenez	Analytic PDFs for non-gaussian processes: towards a full bayesian analysis
10:15	D. Poznanski	Studying the Milky Way via stacks of low S/N spectra
10:15	J.-F. Robitaille	Multiscale analysis of Galactic dust emission
10:15	M. Lochner	Bayesian Inference for Radio Observations: Source Separation

Thursday evening, January 29th

17.30 — 19.45

Statistical Methods in Imaging

Chair : Prof. Dawn Woodard

17:30 Keynote	P. Schniter	Statistical Image Recovery: A Message-Passing Perspective
18:05	D. Woodard	Small-Feature Model-Based Image Segmentation
18:30	J. Morris	Functional Regression Methods for Biomedical Imaging Data
18:55	T. Johnson	Predicting Treatment Efficacy via Quantitative MRI: A Bayesian Joint Model
19:20	S. Greven	A Fully Bayesian Hierarchical Framework for Scalar-on-Image Regression

19.45

Deluxe posters and aperitif

19:45	S. Wei	Asymptotic Inference for Integral Curves of Noisy Vector Fields
19:45	V. Masarotto	Bayesian Average SParsity
19:45	F. Ong	Beyond Low Rank + Sparse: A Multi-scale Low Rank Decomposition

20.30 : Best Contribution Awards

21.00 : Workshop Dinner

