BASP Frontiers
2017

International Workshop on
Biomedical & **A**stronomical **S**ignal **P**rocessing

BASP
Biomedical and Astronomical
Signal Processing
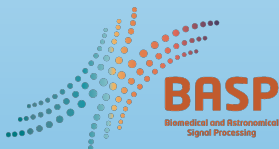
Jan 29 - Feb 3, 2017
www.baspfrontiers.org

Chair

Prof. Yves Wiaux   Heriot-Watt University, UK

Area Chairs

Prof. Jason McEwen   University College London, UK

Prof. Michael Lustig   UC Berkeley, USA

Prof. Philip Schniter   Ohio State University, USA

Session Organizers

Astro - Imaging

Dr. Tim Eifler   NASA JPL, Caltech, USA

Prof. Anna Scaife   University of Manchester, UK

Prof. Benjamin Wandelt   Lagrange Institute Paris, FR

Bio - Imaging

Prof. Karla Miller   University of Oxford, UK

Prof. Ricardo Otazo   New York University, USA

Prof. Daniel Sodickson   New York University, USA

Prof. Martin Uecker   Göttingen University, GE

Signal Processing

Dr. Emilie Chouzenoux   Université Paris Est, FR

Prof. Mario A. T. Figueiredo   Universidad de Lisboa, PT

Prof. Felix Krahmer   Technical University of Munich, GE

Prof. Jean-Christophe Pesquet   CentraleSupélec, FR

Logistics

Dr. Arwa Dabbech	Heriot-Watt University, UK
Prof. Jean-Philippe Thiran	EPFL, Switzerland
Dr. Boris Leistedt	New York University, USA
Mr. Vijay Kartik	EPFL, Switzerland
Ms. Rosie De Pietro	EPFL, Switzerland
Ms. Lynn Smith	Heriot-Watt University, UK
Dr. Alexandru Onose	Heriot-Watt University, UK

Venue

Hotel du Golf & Spa

1884 Villars-sur-Ollon, Switzerland
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www.hoteldugolf.ch

Sponsors

Sunday Jan 29, 15:00 — 17:30

Welcome drink

15:00 - 15:45

Workshop opening

15:45 - 16:00

Conference introduction talk
16:00 - 17:00

Prof. Miles Padgett

Quantum Inspired Imaging with Single-Pixels

Coffee

17:00 - 17:30

Sunday Jan 29, 17:30 — 20:30

Beyond Sparsity Regularization
in Imaging Inverse Problems

Chair: Prof. M. A. T. Figueiredo

17:30 **Keynote**	**M. A. T. Figueiredo**	**Divide (Twice) and Conquer: Patch-based Image Restoration using Mixture Models**
18:05 **Talk**	M. Davies	SURE-ly better reconstructions using AMP
18:30 **Talk**	U. Kamilov	Learning Bayesian Optimal FISTA with Error Backpropagation
18:55 **Talk**	S. Roth	Half-Quadratic Image Models: From Sampling to Discriminative Training
19:20 **Talk**	L. Moisan	Iterated Conditional Expectations for Total Variation Image Restoration

19:45 **Poster***	T. Pock	Fast and effective image restoration with trainable nonlinear reaction diffusion
19:45 **Poster***	M. Pereyra	A differential-geometric derivation of MAP estimation
19:45 **Poster***	N. Shahid	Multilinear Low-Rank Tensors on Graphs & Applications
19:45 **Poster***	P. Schniter	Denoising-based Vector AMP

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20:45 Dinner

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Monday Jan 30, 8:00 — 11:00

Next generation Radio Interferometry

Chair: Prof. M. Hobson

08:00 **Keynote**	**R. Bolton**	**Data Processing Challenges in the SKA era**
08:35 **Talk**	A. Ferrari	Parallel image reconstruction for multi-frequency radio-interferometry
09:00 **Talk**	J-L. Starck	Sparse Reconstruction of Radio Transients and Multichannel Images
09:25 **Talk**	N. Hurley-Walker	The Murchison Widefield Array: Exploring the challenges of low-frequency radio astronomy
09:50 **Talk**	A. Repetti	Joint imaging and DDEs calibration for radio interferometry

10:15 **Poster***	A. Abdulaziz	A distributed algorithm for wide-band radio-interferometry
10:15 **Poster***	M. Simeoni	Laplace Beamshapes for Phased-Array Imaging
10:15 **Poster***	V. Kartik	Fourier dimensionality reduction of radio-interferometric data
10:15 **Poster***	L. Pratley	PURIFYing real radio interferometric observations

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11:00 Free time
17:00 Coffee

* With coffee

Monday Jan 30, 17:30 — 20:30

Neuroimaging: Spanning Scales in Brain Research

Chair: Prof. K. Miller

17:30 **Keynote**	**K. Miller**	**The Challenges and Importance of Scale in Neuroscience**
18:05 **Talk**	J. Cabral	Temporal Scales: From Cellular Activity to Network Dynamics
18:30 **Talk**	D. Alexander	Medical imaging across spatial scales: Microscopic to macroscopic
18:55 **Talk**	S. Smith	Population Imaging: MRI meets big data
19:20 **Talk**	G. Varoquaux	Predictive models to compare subjects from functional connectivity

19:45 **Poster***	M. Chiew	Recovering Brain Network Structure from Highly Under-Sampled FMRI using Electrophysiological Constraints
19:45 **Poster***	T. Dupré la Tour	Parametric Models of Phase-Amplitude Coupling in Neural Time Series
19:45 **Poster***	M. Pesce	Joint kq-space acceleration for fibre orientation estimation in diffusion MRI
19:45 **Poster***	A. Bates	Multi-shell Sampling Scheme with Accurate and Efficient Transforms for Diffusion MRI

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20:45 Dinner

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Tuesday Jan 31, 8:00 — 11:00

Recovery under bilinear and multilinear models

Chair: Prof. F. Krahmer

08:00 **Keynote**	**J. Romberg**	**Phase Retrieval meets Statistical Learning Theory**
08:35 **Talk**	P. Jung	Convex signal reconstruction with positivity constraints
09:00 **Talk**	J. Wright	Nonconvex Recovery of Low-Complexity Models
09:25 **Talk**	F. Krahmer	Optimal Injectivity Conditions for Bilinear Inverse Problems with Applications to Identifiability of Deconvolution Problems
09:50 **Talk**	K. Lee	A nonconvex optimization method for multichannel blind deconvolution with sparsity channel models

10:15 **Poster***	A. Ahmed	System Identification via Diverse Inputs
10:15 **Poster***	D. Stöger	Blind Demixing and Deconvolution: Near-optimal Rate
10:15 **Poster***	P. Jung	Blind Deconvolution and Polynomial Factorization

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11:00 Free time
17:00 Coffee

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Tuesday Jan 31, 17:30 — 20:30

Advanced Statistical Methods to extract Cosmological Information in the LSST Era

Chair: Prof. A. Heavens

17:30 **Keynote**	**J. Zuntz**	**Sampling methods and pipeline design in modern cosmology**
18:05 **Talk**	B. Leistedt	Data-driven, interpretable photometric redshifts for deep galaxy surveys with unrepresentative training data
18:30 **Talk**	J.-L. Starck	Space variant deconvolution of galaxy survey images
18:55 **Talk**	E. Sellentin	Estimated covariance matrices in large-scale structure observations
19:20 **Talk**	O. Smirnov	Challenges of Extreme Dynamic Range Imaging: The Cygnus Files

19:45 **Poster***	B. Leistedt	Spin-SILC: CMB polarisation component separation for next-generation experiments
19:45 **Poster***	M. Simeoni	On Flexibeam for radio interferometry
19:45 **Poster***	N. Gürel	On Denoising Crosstalk in Radio Interferometry
19:45 **Poster***	J.-F. Robitaille	A new perspective on turbulent Galactic magnetic fields

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20:30 Workshop Picture
21:00 Dinner

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Wednesday Feb 1, 8:00 — 11:00

Methods and Tools for Computational Imaging in Biomedicine

Chair: Prof. M. Uecker

08:00 **Keynote**	**M. Uecker**	**The BART Toolbox for Computational Magnetic Resonance Imaging**
08:35 **Talk**	K. Bredies	Higher-order variational regularization approaches for imaging problems
09:00 **Talk**	J. Sijbers	ASTRA Toolbox: a flexible, efficient and open source toolbox for tomographic reconstruction
09:25 **Talk**	S. Kroboth	Pulseq: A Rapid and Hardware-Independent Pulse Sequence Prototyping Framework
09:50 **Talk**	T. Stöcker	JEMRIS: a general-purpose MRI simulator

10:15 **Poster***	X. Cai	Wavelet-Based Segmentation Method for Spherical Images
10:15 **Poster***	R. Duarte	Adaptive-BLIP for Magnetic Resonance Fingerprinting
10:15 **Poster***	S. Cho	CT imaging from sparsely sampled data

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11:00 Free time
17:00 Coffee

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Wednesday Feb 1, 17:30 — 20:30

Advanced optimization methods for solving inverse problems at a large scale

Chairs: Dr. E. Chouzenoux, Prof. J.-C Pesquet

17:30 **Keynote**	**G. Steidl**	**Restoration of manifold-valued images by variational models**
18:05 **Talk**	M. Prato	A multi-component method for high-dynamic range image deconvolution
18:30 **Talk**	E. Chouzenoux	A Block Parallel Majorize-Minimize Memory Gradient Algorithm
18:55 **Talk**	L. Condat	Proximal splitting methods on convex problems with a quadratic term: Relax!
19:20 **Talk**	P. Richtarik	Stochastic Reformulations of Linear Systems and Fast Randomized Iterative Methods

19:45 **Poster***	A. Benfenati	A Proximal Approach for Solving Matrix Optimization Problems Involving a Bregman Divergence
19:45 **Poster***	P. Jung	Convex signal reconstruction with positivity constraints
19:45 **Poster***	P. Ciuciu	New Physically Plausible Compressive Sampling Schemes for High Resolution MRI

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20:45 Dinner

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Thursday Feb 2, 8:00 — 11:00

Astrostatistics: from galaxies to the universe

Chair: Prof. B. Wandelt

08:00 **Keynote**	**A. Connolly**	**Compression, Sampling, and Classification: techniques for the analysis of a new generation of Petascale surveys**
08:35 **Talk**	E. Anderes	CMB delensing for detecting primordial B-mode fluctuations
09:00 **Talk**	J. Jasche	Bayesian data interpretation with large scale cosmological models
09:25 **Talk**	A. Heavens	Bayesian Hierarchical Modelling of data
09:50 **Talk**	M. Hobson	Bayesian compressed sensing

10:15 **Poster***	F. Lanusse	Deep Generative Models of Galaxy Images for the Calibration of the Next Generation of Cosmological Surveys
10:15 **Poster***	R. Joseph	Teaching computers to see colours in the Hubble Frontier Fields with Morphological Component Analysis-based method
10:15 **Poster***	E. Higson	Statistical properties of nested sampling parameter estimation

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11:00 Free time
17:00 Coffee

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Thursday Feb 2, 17:30 — 20:30

The changing face of biomedical imaging

Chair: Prof. R. Otazo

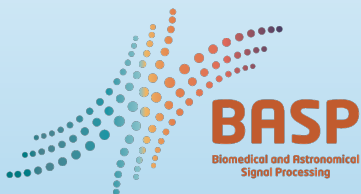|		
17:30 **Keynote**	**E. Rothenberg**	**The New Age of Optical Microscopy**
18:05 **Talk**	K. Taguchi	Photon Counting Spectral X-Ray CT: Toward Tissue-Specific Quantitative Imaging
18:30 **Talk**	J. Nuyts	Multimodality reconstruction in PET/CT and PET/MR
18:55 **Talk**	T. Pock	Learning a variational model for image reconstruction
19:20 **Talk**	J. Cheng	Rapid Motion-Robust MRI

19:45 **Poster***	F. Lam	A Subspace Apporach to Ultrahigh-Resolution MR Spectroscopic Imaging
19:45 **Poster***	L. Di Sopra	Automatic Motion Signal Extraction for Fully Self-Gated 5D Whole-Heart Imaging: Preliminary Results
19:45 **Poster***	D. Kurzhunov	Proton-constrained iterative reconstructions of 17O-MRI images for CMRO2 quantification
19:45 **Poster***	Z. Chen	Beamforming-deconvolution: A novel concept of deconvolution for ultrasound imaging

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20:30 Best contribution awards
21:00 Workshop Dinner

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