

International Workshop on Geometry, PDE's and Lie Groups in Image Analysis

24-26 August 2016 – Eindhoven

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Session A: Geometry and Control in Vision

Wednesday 24th August 2016

Chair: **Yuri Sachkov**

- 09:15 Opening words Remco Duits and Yuri Sachkov
- 09:30 **A1: Geodesics, Laplacians and random walks in sub-Riemannian geometries** **Ugo Boscain** (Ecole Polytechnique CMAP, Paris)
- 10:10 **A2: Spatio-temporal geometry of motion perception in primary visual cortex** **Davide Barbieri** (Dep. de Matemáticas, Universidad Autónoma de Madrid)
- 10:50 Mini-Break
- 11:10 **A3: Tracking of Lines in Spherical Images via Sub-Riemannian Geodesics in $SO(3)$** **Alexey Mashtakov** (Control Processes Research Center, Program Systems Institute of RAS, Moscow)
- 11:50 **A4: Sub-Riemannian minimizers and cut locus on the Engel group** **Yuri Sachkov** (CPRC, Program Systems Institute of RAS, Moscow)
- 12:30 Lunch
- 14:00 **A5: Barycentric Subspace Analysis: an extension of PCA to Manifolds** **Xavier Pennec** (INRIA Sophia-Antipolis, France)
- 14:40 **A6: The problem of stability in early vision, conformal geometry and spherical model of hypercolumns by Bressloff-Cowan** **Dmitri Alexeevsky** (Institute for Information Transmission Problems RAS, Moscow)
- 15:20 **A7: Exact Solutions and Analysis of the 3D direction Process & (Hypo-)elliptic Diffusion on $SE(3)$** **Jorg Portegies** (CASA, TU/e Eindhoven)
- 16:00 Coffee and informal discussions

Session B: Lie Group Analysis and PDEs in Image Analysis

Thursday 25th August 2016

Chairs: **Remco Duits & Erik Bekkers**

- 09:30 **B1: Connecting Linear Systems and Morphology** **Joachim Weickert** (Mathematical Image Analysis Group, Saarland University)
- 10:10 **B2: Seeking invariants in the image to surface (inverse) map** **Steven Zucker** (Computer Science and Biomedical Engineering, Yale University) and **Ben Kunsberg** (Brown University)
- 10:50 Mini-Break
- 11:10 **B3: A cortically based system of PDEs in Lie groups for modal completion** **Giovanna Citti** (Dep. of Mathematics, University of Bologna)
- 11:50 **B4: Time-causal and time-recursive spatio-temporal receptive fields for computer vision and computational modelling of biological vision** **Tony Lindeberg** (Computational Brain Science Lab, KTH Stockholm)
- 12:30 Lunch
- 14:00 **B5: Computation of Curvature Penalized Shortest Paths via the Fast Marching Algorithm** **Jean-Marie Mirebeau** (Lab. de mathématiques d'Orsay, University Paris-Sud CNRS)
- 14:40 **B6: Lie-groups and diffusion equations on image feature representations motivated by computational neuroscience** **Michael Felsberg** (Institutionen for systemteknik, Linköping University)
- 15:20 **B7: A variational formulation of the sub-Riemannian model of the primary visual cortex** **Dario Prandi** (CEREMADE, University Paris-Dauphine)
- 16:00 Mini-Break

- 16:20 **B8: Image processing via invertible orientation scores of 3D images** **Michiel Janssen** (CASA, TU/e Eindhoven)
- 17:00 **B9: Multiscale Segmentation via Bregman Distances and Nonlinear Spectral Analysis** **Christophe Brune** (Dep. of Applied Mathematics, University of Twente)
- 17:40 Informal discussions and walk towards workshop diner location (Natlab)
- 18:30 Workshop diner

Session C: Differential Geometry in Neuro-imaging

Friday 26th August 2016

Chair: **Andrea Fuster**

- 09:30 **C1: Non-holonomicity and Parallel Transport in Biological Fibrous Composites** **Kaleem Siddiqi** (School of computer science, McGill University)
- 10:10 **C2: Bundle Analytics: Computation in the Space of Streamlines** **Maxime Descoteaux** (Sherbrooke Connectivity Imaging Lab, University of Sherbrooke)
- 10:50 Mini-Break
- 11:10 **C3: Whole-brain cortical parcellation: A hierarchical method based on dMRI tractography** **David Moreno** (Mint Labs, Barcelona)
- 11:50 **C4: PDEs for Quantitative Biomedical Image Analysis** **Thomas Schultz** (Visualization and Medical Image Analysis Group, University of Bonn)
- 12:30 **C5: Implementation of Diffusions on SE(3) in DIPY and Applications in DW-MRI: Localization of the Optic Radiation for Epilepsy Surgery** **Stephan Meesters** (CASA TU/e & Epilepsy Institute Kempenhaeghe Heeze)
- 13:10 Lunch
- 14:00 **C6: Cartan connections on Lie groups with applications to neuroimaging (Alzheimer's Disease modeling)** **Marco Lorenzi** (Translational Imaging Group, University College London)
- 14:40 **C7: Tracts as distributions over trajectories: Tractography and Analysis** **Aasa Feragen** (DIKU, Dep. of Computer Science, University of Copenhagen)
- 15:20 Mini-Break
- 15:40 **C8: Practicalities and Challenges in diffusion MRI** **Alexander Leemans** (ISI, University Medical Center Utrecht)
- 16:20 **C9: Geometry in diffusion MRI - modeling and analysis** **Tom Dela Haije** (CASA Eindhoven University of technology)
- 17:00 Closing words Andrea Fuster and drinks