

## Foreword

This volume of *Journal of Physics: Conference Series* is dedicated to the scientific contributions presented during the 3rd International Workshop on New Computational Methods for Inverse Problems, NCMIP 2013 ([http://www.farman.ens-cachan.fr/NCMIP\\_2013.html](http://www.farman.ens-cachan.fr/NCMIP_2013.html)). This workshop took place at Ecole Normale Supérieure de Cachan, in Cachan, France, on 22 May 2013, at the initiative of Institut Farman. The prior editions of NCMIP also took place in Cachan, France, firstly within the scope of the ValueTools Conference, in May 2011 (<http://www.ncmip.org/2011/>), and secondly at the initiative of Institut Farman, in May 2012 ([http://www.farman.ens-cachan.fr/NCMIP\\_2012.html](http://www.farman.ens-cachan.fr/NCMIP_2012.html)).

The NCMIP Workshop focused on recent advances in the resolution of inverse problems. Indeed inverse problems appear in numerous scientific areas such as geophysics, biological and medical imaging, material and structure characterization, electrical, mechanical and civil engineering, and finances. The resolution of inverse problems consists of estimating the parameters of the observed system or structure from data collected by an instrumental sensing or imaging device. Its success firstly requires the collection of relevant observation data. It also requires accurate models describing the physical interactions between the instrumental device and the observed system, as well as the intrinsic properties of the solution itself. Finally, it requires the design of robust, accurate and efficient inversion algorithms. Advanced sensor arrays and imaging devices provide high rate and high volume data; in this context, the efficient resolution of the inverse problem requires the joint development of new models and inversion methods, taking computational and implementation aspects into account. During this one-day workshop, researchers had the opportunity to bring to light and share new techniques and results in the field of inverse problems.

The topics of the workshop were: algorithms and computational aspects of inversion, Bayesian estimation, kernel methods, learning methods, convex optimization, free discontinuity problems, metamodels, proper orthogonal decomposition, reduced models for the inversion, non-linear inverse scattering, image reconstruction and restoration, and applications (bio-medical imaging, non-destructive evaluation...).

NCMIP 2013 was a one-day workshop held in May 2013 which attracted around 60 attendees. Each of the submitted papers has been reviewed by three reviewers. Among the accepted papers, there are seven oral presentations, five posters and one invited poster (On a deconvolution challenge presented by C Vonesch from EPFL, Switzerland). In addition, three international speakers were invited to present a longer talk.

The workshop was supported by Institut Farman (ENS Cachan, CNRS) and endorsed by the following French research networks (GDR ISIS, GDR Ondes, GDR MOA, GDR MSPC). The program committee acknowledges the following research laboratories CMLA, LMT, LSV, LURPA, SATIE.

**Laure Blanc-Féraud and Pierre-Yves Joubert**



**Workshop co-chair**

Laure Blanc-Féraud, I3S laboratory and INRIA Nice Sophia-Antipolis, France

Pierre-Yves Joubert, IEF, Paris-Sud University, CNRS, France

**Technical program committee**

Gilles Aubert, J-A Dieudonné Laboratory, CNRS and University of Nice-Sophia Antipolis, France

Nabil Anwer, LURPA, ENS Cachan, France

Alexandre Baussard, ENSTA Bretagne, Lab-STICC, France

Marc Bonnet, ENSTA, ParisTech, France

Antonin Chambolle, CMAP, Ecole Polytechnique, CNRS, France

Oliver Dorn, School of Mathematics, University of Manchester, UK

Cécile Durieu, SATIE, ENS Cachan, CNRS, France

Gérard Favier, I3S Laboratory, University of Nice Sophia-Antipolis, France

Mário Figueiredo, Instituto Superior Técnico, Lisbon, Portugal

Laurent Fribourg, LSV, ENS Cachan, CNRS, France

Marc Lambert, L2S Laboratory, CNRS, SupElec, Paris-Sud University, France

Dominique Lesselier, L2S Laboratory, CNRS, SupElec, Paris-Sud University, France

Matteo Pastorino, DIBE, University of Genoa, Italy

Christian Rey, LMT, ENS Cachan, CNRS, France

Simon Setzer, Saarland University, Germany

Cedric Vonesch, EPFL, Switzerland

**Local chair**

Sophie Abriet, SATIE Laboratory, ENS Cachan, France

Béatrice Bacquet, SATIE Laboratory, ENS Cachan, France

Lydia Matijevic, LMT Laboratory, ENS Cachan France

**Invited speakers**

Jérôme Idier, IRCCyN (UMR CNRS 6597), Ecole Centrale de Nantes, France

Massimo Fornasier, Faculty of Mathematics, Technical University of Munich, Germany

Matthias Fink, Institut Langevin, ESPCI, Université Paris Diderot, France