



 **Jérémi DARDÉ**

From France to Finland 

Project: **Electrical Impedance Tomography (EIT)**

Research topic: **Mathematics**

Finnish Institution: **Department of Mathematics and Systems
Analysis Aalto University, Helsinki**

French Institution: **Toulouse Mathematics Institute, Université Paul
Sabatier**

Dates of mobility: **24/01/2022 to 29/01/2022**

Program: **Maupertuis Programme**



PRESENTATION

[Jérémi Dardé](#) earned his doctoral degree from [Université Paris Diderot](#) in 2010. During 2011-2012, he worked as a postdoctoral researcher at [Aalto University](#), in the Inverse Problem research group. Dardé specializes in inverse problems, in particular geometrical inverse problems for partial differential equations and stability issues for elliptic inverse problems. He also works on control theory for parabolic equations, more precisely on optimality questions: optimal characterization of reachable sets, optimal cost of controllability, minimal time issues for degenerate equations. He is an author of about twenty articles published in international peer-reviewed scientific journals, including SIAM journals, Analysis & PDE, Inverse Problems and Imaging, Inverse Problems, and Control, Optimisation and Calculus of Variations.

ACTIVITIES IN FINLAND

During his stay, Jérémi Dardé could discuss with [Nuutti Hyvönen](#) several possible subjects of collaboration regarding medical imaging, including Sweep Data in Electrical Impedance Tomography (EIT) and electrodes model for Electrocardiographic Imaging (ECGi). EIT is a noninvasive internal conductivity reconstruction technique from electrical measurements on the body surface, and the Sweep Data is an experimental protocol using only two electrodes, one fixed and the other revolving around the body. Such model has been proposed in 2012 by Nuutti Hyvönen and co-authors. Its well-posedness is already established, and efficient algorithms have been developed to reconstruct inclusions from the measurement. However, it is still not known if the sweep data defines uniquely certain types of inclusion, which is the precise topic we investigate during my stay. Secondly, ECGi is a non-invasive imaging technique used in the prevention of cardiac arrhythmias, in particular ventricular fibrillation. We discuss the possibility to use electrode models commonly used in EIT, in the slightly different context of ECGi, to improve the accuracy of the reconstruction algorithms.