



UNIVERSITÀ DI PISA

MSCA - Individual Fellowships (IF).

Postdoc in Synthetic Aperture Radar (SAR) Tomography



The synthetic aperture radar (SAR) Interferometry and Tomography research group at the Department of Information Engineering of the University of Pisa, Italy, is looking for expressions of interest from postdoctoral-level researchers wishing to apply for a Marie Skłodowska-Curie Action - Individual Fellowship (deadline 12th September 2018) on the following topic:

Multidimensional (3D / 4D / "5D") synthetic aperture radar (SAR) Tomography processing and related environmental remote sensing applications.

The research project will focus on:

- developments of advanced algorithms and information extraction methods, full 3D, 4D (3D+Time), and "5D", and related analytical and simulated performance characterization;
- real data experiments (airborne and satellite), on urban / critical infrastructure and natural (forest) scenarios, and investigations of possible new application developments.

Applicants should demonstrate a strong research potential and relevant background, with publications in top-ranked journals and conferences in a related research field; a Ph.D. degree in Electrical Engineering, or Computer Science, Telecommunications, Applied Mathematics, Physics, is of advantage.

Eligibility requirements

- 1) **Mobility:** the applicant may be of any nationality but must not have resided or carried out his/her main activity (work, studies, etc.) in Italy for more than 12 months in the three years immediately before 12th September 2018.
- 2) **Experience:** at the date of the call deadline (12th September 2018), the applicant must be in possession of a doctoral degree or have at least four years of full-time equivalent research experience.
- 3) **Competences:** preferred background and expertise in Mathematical modelling, and Programming (MATLAB or IDL); competences of advantage are Signal processing, (linear) System analysis, Probability random variables and random signals, Statistics and/or Parameter estimation or detection, Inverse problems, Numerical calculus, Remote sensing and radar techniques and/or systems, Synthetic aperture radar (SAR), SAR Interferometry, and also Geomatic engineering. Good written and spoken English is required.

HOSTING INSTITUTION AND SUPERVISOR

With its 20 Departments, the [University of Pisa](#), founded in 1343, is one of the largest and top ranked Universities in Italy. Pisa (Tuscany) provides an ideal environment for living.

The **Department of Information Engineering**, one of the largest National and European ICT departments (both for its dimensions and for the quality of its teaching and research activities) focuses on several sectors: Applied Electromagnetics, Automation and Robotics, Biomedical Engineering, Computer Engineering, Electronics, and Telecommunication Engineering including Remote Sensing and Radar. The Department recently obtained the qualification of Department of Excellence from the Italian Ministry of University and Research.

In case of successful application to the MSCA scheme, the researcher will be part of the **Synthetic Aperture Radar (SAR) Interferometry and Tomography research group**, coordinated by Prof. Lombardini. In the last two decades, the group has carried out cutting-edge research proposing useful new principles and innovative methods, often adopted or further developed in recent SAR techniques by different worldwide level research groups, space institutions, and enterprises: the principle of optimal coherent SAR data combination in SAR Interferometry; the use of superresolution algorithms in SAR Tomography in particular Capon; the mode of 4D and higher order Differential SAR Tomography for both urban and natural scene analyses. The group has carried out several national and international research projects in the field, in particular performing 3D airborne tomographic analysis of boreal forests in a study by the European Space Agency (ESA) in the frame of a supporting campaign for the BIOMASS satellite program, and of developing 4D Differential Tomography methods for deformation monitoring of urban areas in studies funded by the EC, with Telespazio/E-Geos, and by the Italian Space Agency (ASI), the latter project with Cosmo-Skymed satellite data. The group has published relevant papers on urban/forest Tomography and 4D SAR imaging. The group has access to top-level facilities, including ground-based mini radars; other HW and SW resources are provided by the campus, including a supercomputing facility, licences for scientific software as MATLAB, and access to the IEEE digital library.

Prof. Fabrizio Lombardini (IEEE Senior Member '03), PhD, is Associate Professor at the Department of Information engineering of the University of Pisa. During his career, he has been recipient of a Marie Curie fellowship, which he spent as postdoctoral researcher at the Department of Electronic and Electrical Engineering of University College London, UK. He has also been Visiting Researcher at the Jet Propulsion Laboratory (JPL), NASA, Radar Science and Engineering Section, CA. He is Associate Editor of the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS). He has authored or co-authored more than 140 papers (peer-review journals and proceedings of international conferences), and holds 1 european and 2 national patents.

Prof. Lombardini's general interests are in the areas of statistical signal processing, estimation and detection, super-resolution and robust spectral analysis, array processing, irregular sampling and sparse signal reconstruction, knowledge-based signal processing, scattering models, and performance bounds evaluation, with application to radar systems and SAR environmental remote sensing. In particular, his research interests include multibaseline and multifrequency Interferometric SAR algorithms, both cross- and along-track, and system feasibility studies, 3D SAR Tomography, and Differential SAR Interferometry. He has originated the new mode of 4D SAR imaging (Differential SAR Tomography). He has organized and chaired more than 20 special sessions, and has been lecturer of 10 tutorials on these topics, at international conferences.

APPLICATION PROCEDURE

Expressions of interest must be sent by email to f.lombardini@iet.unipi.it no later than **August 17th, 2018** and must consist of two pdf files:

- 1) **Complete and updated CV**, clearly demonstrating all 3 eligibility requirements.
- 2) **Motivation letter**, maximum one page.

Expressions of interest not respecting this procedure will be disregarded.