## Supervisor Expression of Interest
**MSCA - Marie Skłodowska Curie Action - (PF) Postdoctoral Fellowship 2021**

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<tr>
<th><strong>Supervisor name:</strong></th>
<th>Paola Saccomandi</th>
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<tr>
<td><strong>Email address:</strong></td>
<td><a href="mailto:paola.saccomandi@polimi.it">paola.saccomandi@polimi.it</a></td>
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| **Link pagina docente:** | [https://www.mecc.polimi.it/us/research/faculty/faculty/prof-paola-saccomandi/](https://www.mecc.polimi.it/us/research/faculty/faculty/prof-paola-saccomandi/)  
[http://www.laseroptimal.polimi.it/](http://www.laseroptimal.polimi.it/) |
| **Department Name:** | Department of Mechanical Engineering |
| **Research topic:** | PE1_18 Scientific computing and data processing  
PE7_11 Components and systems for applications in medicine, biology and the environment, etc.  
PE8_13 Industrial bioengineering  
LS7 Applied Medical Technologies, Diagnostics, Therapies and Public Health |
| **MSCA-PF Research Area Panels:** | - CHE_Chemistry  
- ECO_Economic Sciences  
- ENG_Information Science and Engineering  
- ENV_Environmental and Geosciences  
- LIF_Life Sciences  
- MAT_Mathematics  
- PHY_Physics  
- SOC_Social Sciences and Humanities |
| **Politecnico di Milano Areas:** | - Cultural Heritage  
- Smart Cities  
- Horizon Europe Missions  
- Health  
- Industry 4.0 |
| **Title and brief description of the Department and Research Group (including URL if applicable):** | The LAMBDA Lab (“Laboratory of Measurement for Biomedical Applications”) is part of the Measurement group of the Department of Mechanical Engineering, and has been created by the ERC group LASER OPTIMAL. The team focuses on the development of a technological platform for the optimization of laser ablation in cancer treatment, based on the following aspects: 1) monitoring of the tissue thermal outcome 2) physical simulations for treatment settings planning; 3) nanoparticles-enhanced photothermal therapy; 4) intra-operative adjustment of the pre-planned settings for personalized treatment. The research activities encompass |
several topics in the healthcare sector, including medical and multimodal imaging, fiber optic sensors for physiological parameters monitoring, light-tissue interaction, thermometry.

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<th>Brief project description: (max 1 page)</th>
<th>Novel solutions for intraoperative control of the laser ablation therapy for cancer treatment.</th>
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<td>Electromagnetic-based thermal techniques are currently widely investigated as minimally invasive treatments for solid tumor removal. Among the diverse ablative procedures, laser ablation (LA) has raised considerable attention for clinical applications. Typical advantages are the capability to deliver the therapeutic laser beam through small and flexible optical fibers able to target deep-seated organs, and the compatibility with diagnostic imaging techniques for therapy guidance. Furthermore, the reduced invasiveness and pain, associated with this ablative procedure, could reduce the recovery time, and could represent an alternative to surgical resection. However, LA still holds some limitations such as the potential risk of irreversible injury to the surrounding healthy structures. Indeed, the maintenance of thermal coagulation and necrosis within the selected tissue margins, surrounding the targeted tumor shape, is often challenging, and patient specific treatments are needed. The absence of a real-time temperature feedback control strategy and the lack of dedicated pre-treatment planning, are the main responsible for the inaccuracy of the overall thermal procedure. In this context, key-aspects to be addressed via a specific project proposal under the MSCA-IF framework are: 1) the development of a numerical framework for the laser ablation settings planning and their intra-operative adjustment (based on data assimilation) for personalized treatment; 2) the design and development of smart theranostic tools for the intraoperative control of the therapy. The candidate can elaborate the proposal on one or both topics, considering the multidisciplinary nature of the proposed research and approach. One of the relevant aspects for the proposal success is the well-established network of national and international collaborations of the host LASER OPTIMAL research team with prestigious groups. These collaborations cover the fields of engineering, medical technology, chemistry, biology, nanotechnology, and include hospitals. The MSCA-IF candidate can benefit from this network to strengthen the development of the research, training, and career development plans for the project. The list of publication of the supervisor and the latest outcome of the research are available at this link: <a href="https://scholar.google.it/citations?hl=it&amp;user=VBOinLAAAAA">https://scholar.google.it/citations?hl=it&amp;user=VBOinLAAAAA</a> J&amp;view_op=list_works</td>
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