

Expression of Interest-UPM Supervisor

Marie Skłodowska Curie Action–Postdoctoral Fellowship 2026 (MSCA-PF-2026)

Supervisor Name	Charles-Alexis ASSELINEAU
Email	Charlesalexis.asselineau@upm.es
Department /Institute	Department of Energy Engineering
Research Area	<p>Physics (PHY)</p> <ul style="list-style-type: none"> - P5 - Applied physics: <ul style="list-style-type: none"> o Computational modelling o Optical engineering, photonics, lasers - G1 - Computer science and informatics <ul style="list-style-type: none"> o Numerical analysis, simulation, optimisation, modelling tools
Research team/group	<p>The TE4S (Thermal Energy for Sustainability) research group active in a range of research lines: hydrogen production, electrification of process heat, production of renewable electricity and heat from solar energy, thermal energy storage and waste-heat recovery.</p> <p>TE4S manages fully instrumented turbomachinery testing cells, a liquid metal methane pyrolysis reactor, solar concentrators, a temperature sensor calibration facility and a PTES loop. TE4S has access to a wider range of facilities within UPM and the federated lab access platform of the Madrid region. Knowledge-wise, TE4S has internationally relevant expertise in heat transfers with notably in: coupled multiphysics models, radiative transfers, Monte-Carlo ray tracing, turbomachinery, microfluidics and dynamic system modelling.</p>
Keywords	Monte-Carlo methods, electromagnetics, light-matter interactions
Research Focus	<p>Improved Monte-Carlo methods for light-matter interactions in the wave-optics regime</p> <p>Electromagnetics are needed to evaluate light-matter interactions in the presence of random or periodic geometries with dimensions comparable to wavelength. This situation is common in high-temperature and energy applications where the roughness of typical engineering components and the use of light-trapping and gratings can lead to interference phenomena in the infrared range.</p> <p>Deterministic computational electromagnetic methods are powerful simulation tools that can be very computationally intensive. Statistical methods based on Monte-Carlo sampling have potential advantages for complex geometries but only apply to limited subsets of problems (electrostatics and magnetostatics).</p> <p>This project will explore new approaches to improve the applicability of Monte-Carlo methods to the solution of electromagnetics problems relevant to light-matter interactions. The aim is to leverage on the advantages and recent advances in Monte-Carlo methods to provide alternative and efficient methods.</p>
Applications: documents to be submitted and deadlines	Provide an updated academic CV, a motivation letter indicating the most relevant merits related to the research focus and at least one recommendation letter to charlesalexis.asselineau@upm.es by the end of April 2026.