



PhD in INGEGNERIA AEROSPAZIALE / AEROSPACE ENGINEERING - 38th cycle

PNRR_352 Research Field: RESPONSIVE LAUNCH TECHNOLOGY FOR IN-ORBIT OPERATIONS

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	<p>Funded by PNRR M4C2 (dalla ricerca all'impresa) Contributes to M1C2 (digitalizzazione, innovazione e competitività nel sistema produttivo)</p> <p>Space market is evolving rapidly towards new services and applications. On the one side, the development of space platforms with rapid development time (e.g. cubesats, small satellites) faces the bottleneck of a slow launch service responsiveness due to infrastructure limits, and lack of dedicated launch slots. On the other side, the development of satellite constellations poses the question about the maintenance, the potential servicing, and the end-of-life management of said platforms.</p> <p>The aim of this project is to study the possibility of new on-demand launch service characterized by high degree of flexibility for rapid response to market demands, specifically conceived for fast payload LEO placing, servicing, or removal.</p> <p>The project will target the following parts:</p> <ul style="list-style-type: none"> ¿ definition of the mission configuration and the requirements on the launch system depending on the final target altitude and the service to be executed. ¿ The conceptual design of a launch vehicle capable of performing the selected missions ¿ The flow-down of the requirements towards the different subsystems and specialistic disciplines, including



	<p>flight dynamics, control, aerodynamics, high temperature materials, and propulsion.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The candidate will learn techniques of conceptual design applied to launch systems, multidisciplinary optimization techniques for simplified and detailed trajectory analysis, fundamentals of design disciplines (aerothermodynamics, high temperature materials, GNC).</p>
<p>Educational objectives</p>	<p>The candidate will develop capabilities of complex space system design integrating knowledge from different disciplines and different degrees of detail, from conceptual analysis to subsystem requirement flow down.</p> <p>The candidate will develop a specialistic knowledge in launch vehicle design and optimization and will gain an enhanced vision over the conceptual and preliminary development process of a new product, in cooperation with industrial experts. In addition, by working in a mixed and vibrant academic and industrial context, the candidate will have the opportunity to learn several transferable skills, including communication skills, team working, leadership, ethical aspects associated with the use of innovative technologies. In support of this, the PhD School of Politecnico di Milano provides a complete and rather diverse offer of courses. Each candidate must include in their syllabus at least 10 ECTS in transferable skills, to complement at least other 5 ECTS in technical disciplines associated with Aerospace Engineering, for a total of at least 20 ECTS.</p>
<p>Job opportunities</p>	<p>The candidates will find natural opportunities in the national, European and worldwide space industry, including the development of complex space launch systems and correlated sub-systems. The candidates may also find opportunities in numerous other high-tech industrial fields, in which competences in dynamics, control, aeromechanics and optimization, as well as experience gathered in the integrated design of complex systems play a fundamental role, centred on but not</p>



	limited to industrial engineering.
Composition of the research group	1 Full Professors 1 Associated Professors 1 Assistant Professors 3 PhD Students
Name of the research directors	Prof. Filippo Maggi

Contacts	
Dipartimento di Scienze e Tecnologie Aerospaziali - Politecnico di Milano Via La Masa 34, 20156, Milano - Italy +390223998287 - email: filippo.maggi@polimi.it - web site: www.aero.polimi.it	

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	MBDA
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Technion, Haifa, Israel
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information	
The PhD candidate will receive a desk and a personal computer, if needed. Apart from the compulsory ones, the PhD candidate will have the opportunity to follow additional courses, to receive economic support to attend summer schools and participate in conferences. There will be the possibility of paid teaching assistantship.	