



PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 40th cycle

PNRR 630 Research Field: EROSIONE E SPUTTERING DI MATERIALI DI PRIMA PARETE IN TOKAMAK E LINEAR PLASMA DEVICES

Monthly net income of PhDscholarship (max 36 months)

€ 1500.0

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

The study of plasma-material interaction is a central issue for the development of future nuclear fusion reactors. Materials must resist the harsh fusion environment; surface degradation must be contained to avoid polluting the core plasma with impurities from the walls of the fusion chamber. The PhD project focuses on three aspects: (i) modelling surface erosion and migration of eroded materials in existing linear devices, such as GyM, and tokamaks, e.g. AUG, addressing also the impact of foreign impurities in plasma, e.g. oxygen, on wall erosion; (ii) application of the acquired knowledge and methods to support the design of future tokamaks, with reference to relevant scenarios for DTT or SPARC and to diagnostics selection and positioning; (iii) investigation of the role of microscale morphology of plasma-exposed surfaces on their sputtering properties. The study is supported by Eni SpA in the framework of a collaboration with CNR and the DTT consortium.

Methods and techniques that will be developed and used to carry out the research

Simulations of the erosion phenomena in the whole volume of linear devices and tokamaks will be run using the code ERO2.0. Erosion and impurity migration modelling will require global machine parameter input; this will be provided by coupling the ERO code with suitable edge plasma codes, as SOLPS-ITER or SOLEDGE.



	Microscale simulations will be performed exploiting the tools available in ERO2.0 package, in direct connection with experimental activities.
Educational objectives	Education of people to be launched in the world of research and high technology industry in the fields of physics and engineering of materials, able to manage interdisciplinary issues, perform and interpret complex experiments and produce new equipment.
Job opportunities	Private and public R&D. Highly qualified positions in a wide range of industries, for examples related with production, development, and use of advanced materials. The present research will be performed in collaboration with national and international partners.
Composition of the research group	3 Full Professors 4 Associated Professors 1 Assistant Professors 15 PhD Students
Name of the research directors	Matteo Passoni

Contacts	
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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	750.0 €
By number of months	6



National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	ENI SpA
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	to be defined
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Educational activities: Financial aid per PhD student is available for purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. This amount is equal to 10% of the annual gross amount, for 3 years.</p> <p>Teaching assistantship: Availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.</p> <p>Computer availability: individual use. Desk availability: individual use.</p>