



PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 37th cycle

THEMATIC Research Field: MULTI-SCALE AND MULTI-PHYSICAL MODELLING OF FUEL PIN BEHAVIOUR IN GEN III+ AND GEN IV REACTORS

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	
<p>Motivation and objectives of the research in this field</p>	<p>The aim of the proposed research activity is the development of advanced models for the prediction of fuel behaviour in Gen III+ and Gen IV reactors. The activity involves multi-scale and multi-physical modelling of several processes occurring in the fuel and in the cladding, including but not limited to fission gas evolution. In the frame of multi-scale analysis, reduced order modelling is going to be applied for the description of specific phenomena (e.g., inert gas and fission product mobility), whereas a multi-physical scheme involving thermo-hydraulics and neutronics calculations is going to be used to construct the boundary conditions for fuel performance analyses (e.g., towards parametric safety analyses with different fuel compositions). Verification and validation of the developed models is a pillar of the proposed research activity. The PhD work is grafted in the frame of the EURATOM Project PATRICIA (https://patricia-h2020.eu/, targeting multi-scale/multi-physics modelling of Am-bearing fuel pins for application in MYRRHA reactor), and collaboration with other international research programs is envisaged, including possibility for mobility periods.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>Different software tools are to be used in this activity: TRANSURANUS/BISON (fuel performance), SCIANTIX/MFPR-F (multi-scale fission gas/fission</p>



	products), SERPENT (neutronics), OpenFOAM (CFD), Matlab. The verification of the developed models is going to be in line with state-of-the-art methods, i.e., MES, MMS, random numerical experiments. The validation of the developed codes is going to be performed on selected experimental databases (to be identified as part of the activity).
Educational objectives	The research will provide high level scientific education, know-how and expertise in the nuclear energy & innovative reactors areas, to prepare the candidate for his/her future activities in the world of research and technology. The candidate will obtain in-depth knowledge on modelling of complex systems (including advanced modelling techniques) and experimental investigations (achieved as part of the validation activity).
Job opportunities	The candidate will develop skills and networking, allowing for job opportunities in private R&D sector, public research institutes and universities. Highly qualified job positions in a wide range of companies (e.g., related to nuclear energy and nuclear materials) are possible as well.
Composition of the research group	1 Full Professors 2 Associated Professors 1 Assistant Professors 7 PhD Students
Name of the research directors	Lelio LUZZI

Contacts	
lelio.luzzi@polimi.it +39-022399-6326 https://www.researchgate.net/lab/Lelio-Luzzi-Lab	

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	566.36 €
By number of months	0

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

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, instrumentation and computer, etc. The amount is about Euro 3.000,00.

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.

Awards:

Awards will be recognized to the PhD candidate up to Euro 1.500,00 (gross amount, after completion of the 3rd year). More details about this program will be provided by PhD Program Steering Committee.

Computer availability: individual use.

Desk availability: individual use.