

ROBERTO PONCIROLI, PhD

1130 South Michigan Avenue, 60605, Chicago, IL – United States
+1-312-752-5860 rponciroli@anl.gov/roberto.ponciroli@gmail.com

EDUCATION

- Argonne National Laboratory**, Illinois (USA), January 2015 - Present
Post-doctoral appointee at Nuclear Engineering Division
Supervisor: Dr. Richard B. Vilim (Nuclear Analysis Department - Plant Analysis & Diagnostics)
- Argonne National Laboratory**, Illinois (USA), June–August 2013
Guest Graduate at Nuclear Engineering Division
Supervisor: Dr. Richard B. Vilim (Nuclear Analysis Department - Plant Analysis & Diagnostics)
- Control strategies definition for fast runback transient in sodium-cooled SMRs.
- Politecnico di Milano**, Italy 2011 – 2014
Ph.D. in Energy and Nuclear Science and Technology
Doctoral Research Advisor: Prof. Antonio Cammi
- Development of a Model-based approach for studying the system dynamics and control of Gen-IV Lead-cooled Fast Reactors.
- Politecnico di Milano**, Italy 2008 – 2010
M.S. in Nuclear Engineering
GPA: 29.8/30.0 Final grade: 110/110 cum Laude
- Object-Oriented Modeling of the TRIGA Mark II reactor of the University of Pavia.
- Politecnico di Milano**, Italy 2005 – 2008
B.S. in Energy Engineering
GPA: 27.99/30.0 Final grade: 110/110
- Non Destructive Techniques of analysis of Nuclear Materials.

PROFESSIONAL INTERESTS

- Object-oriented modeling of the Nuclear Power Plants (NPPs) and free dynamics transients simulation.
- Full power mode control schemes definition. Controllers design procedure and interactions evaluation.
- Petri nets approach for reactor startup definition. NPP Supervisory control system design.
- Load-frequency regulations and grid operation by adopting Gen-IV NPP.
- Development of neutronics Reduced Order Models tailored to control-oriented simulators.
- Advanced control strategies for sodium-cooled SMRs and S-CO₂ power plants operation.

WORK EXPERIENCE

- **Collaboration within LEADER Project (Euratom 7th Framework Program)** 2010 – 2013
Task 4.4 “Preliminary Definition of the Control System Architecture of the ALFRED reactor”

ACADEMIC EXPERIENCES

- Teaching Assistant in *Nuclear power plants, Nuclear materials technologies* M.S. courses at Politecnico di Milano.
- Training Activities and Measurements at the TRIGA Mark II reactor of the University of Pavia.
- Native Italian speaker; fluent in English.

COMPUTATIONAL SKILLS

Numerical Computing Environments: FreeFem++, MATLAB, GMSH; *Dynamic System Modelling:* Modelica language, Dymola, MATLAB Simulink; *Neutronics:* SERPENT; *Radiation interaction with Matter:* FLUKA; *Programming Languages:* C, C++; *Others:* Microsoft Office, Solid Edge.

MAIN PUBLICATIONS IN INTERNATIONAL CONFERENCE PROCEEDINGS

- Ponciroli, R., Passerini, S., Vilim, R. B., 2016. *Definition of a Robust Supervisory Control Scheme for Sodium-Cooled Fast Reactors*. Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP 2016), San Francisco, CA, April 17-20, 2016 (submitted).
- Lorenzi, S., Cammi, A., Luzzi, L., Ponciroli, R., 2014. *Object-oriented modelling for the multi-purpose PC-based ALFRED simulator*. Proceedings of the Technical Meeting on Effective Utilization of Nuclear Power Plant Simulators as Introductory Educational Tools, May 19-22, 2014, VIC, Vienna, Austria

- Lorenzi, S., Cammi, A., Luzzi, L., Ponciroli, R., 2014. *Development of a Spatial Neutronics Model for Control-oriented Dynamics simulation*. Proceedings of the 22nd International Conference on Nuclear Engineering (ICONE22), July 7-11, 2014, Prague, Czech Republic.
- Vilim, R. B., Passerini, S., Ponciroli, R., 2014. *Active Control and Inherently Safe Operation in Advanced SMRs*. Proceedings of the ASME 2014 Small Modular Reactors Symposium, Washington, D.C., April 15-17, 2014.
- Ponciroli, R., Passerini, S., Cammi, A., Luzzi, L., Vilim, R. B., 2014. *Innovative Control Strategy for the Fast-Runback Transient in a Sodium-Cooled Small Modular Reactor*. Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP 2014), Charlotte, NC, April 6-9, 2014.
- Vilim, R. B., Passerini, S., Ponciroli, R., 2014. *Enhanced Operability in the ASMR for Improved Response to Active System Faults and Grid Upset Events*. Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP 2014), Charlotte, NC, April 6-9, 2014.
- Ponciroli, R., Lorenzi, S., Cammi, A., Luzzi, L., 2013. *Petri net approach for a Lead-cooled Fast Reactor startup design*. Proceedings of the International Conference on Fast Reactors and Related Fuel Cycles: Safe Technologies and Sustainable Scenarios (FR13), Paris, France, 4-7 March 2013.
- Ponciroli, R., Bortot, S., Lorenzi, S., Cammi, A., 2012. *Development of an Object-Oriented Dynamics Simulator for a LFR DEMO*. Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP 2012), Chicago, IL, June 24-28, 2012.
- Lorenzi, S., Bortot, S., Ponciroli, R., Cammi, A., 2012. *Evaluation of the coolant reactivity coefficient influence on the dynamic response of a small LFR system*. Proceedings of PHYSOR 2012 – Advances in Reactor Physics, Knoxville, TN, April 15-20, 2012.
- Bortot, S., Artioli, C., Cammi, A., Lorenzi, S., Ponciroli, R., 2011. *Safety issues affecting the feasibility of an early high-flux LFR technology demonstrator*. Transactions of the American Nuclear Society, ANS Winter Meeting, **105**, pp. 697-698, Washington, DC, October 30 - November 3, 2011.
- Borio di Tigliole, A., Cammi, A., Fusar Poli, A., Magrotti, G., Ponciroli, R., 2011. *A zero dimensional model for simulation of TRIGA Mark II dynamic response*. Transactions of the European Research Reactor Conference 2011, Rome, Italy, March 20 - 24, 2011.
- Bigoni, A., Borio di Tigliole, A., Cammi, A., Ponciroli, R., 2011. *An object-oriented approach to simulation of TRIGA Mark II dynamic response*. Transactions of the European Research Reactor Conference 2011, Rome, Italy, March 20 - 24, 2011.

MAIN PUBLICATIONS IN INTERNATIONAL JOURNALS

- Ponciroli, R., Cammi, A., Lorenzi, S., Luzzi, L., 2016. *Petri-net based modelling approach for ALFRED reactor operation and control system design*. In: Progress in Nuclear Energy, **87**, March 2016, pp. 54-66.
- Ponciroli, R., Cammi, A., Della Bona, A., Lorenzi, S., Luzzi, L., 2015. *Development of the ALFRED reactor full power mode control system*. In: Progress in Nuclear Energy, **85**, November 2015, pp. 428-440.
- Ponciroli, R., Cammi, A., Lorenzi, S., Luzzi, L., 2015. *Control approach to the load frequency regulation of a Generation IV Lead-cooled Fast Reactor*. In: Energy Conversion and Management, **103**, October 2015, pp. 43-56.
- Ponciroli, R., Passerini, S., Vilim, R.B., 2015. *Innovative Control Strategy for Fast Runback Operational Transient Applied to SMRs*. In: Nuclear Technology, **191** (2), August 2015.
- Lorenzi, S., Cammi, A., Luzzi, L., Ponciroli, R., 2015. *A Control-Oriented Modelling Approach to Spatial Neutronics Simulation of a Lead-cooled Fast Reactor*. In: Journal of Nuclear Engineering and Radiation Science, **1**, July 2015.
- Sartori, A., Baroli, D., Cammi, A., Chiesa, D., Luzzi, L., Ponciroli, R., Previtali, E., Ricotti, M. E., Rozza, G., Sisti, M., 2014. *Comparison of a Modal Method and a Proper Orthogonal Decomposition approach for multi-group time-dependent reactor spatial kinetics*. In: Annals of Nuclear Energy, **71**, September 2014, pp. 217-229.
- Ponciroli, R., Cammi, A., Lorenzi, S., Luzzi, L., 2014. *A preliminary approach to the ALFRED reactor control strategy*. In: Progress in Nuclear Energy, **73**, May 2014, pp. 113-128.
- Ponciroli, R., Bigoni, A., Cammi, A., Lorenzi, S., Luzzi, L., 2014. *Object-oriented modelling and simulation for the ALFRED dynamics*. Progress in Nuclear Energy, **71**, March 2014, pp. 15-29.
- Borio di Tigliole, A., Cammi, A., Chiesa, D., Clemenza, M., Manera, S., Nastasi, M., Pattavina, L., Ponciroli, R., Pozzi, S., Prata, M., Previtali, E., Salvini, A., Sisti, M., 2013. *TRIGA reactor absolute neutron flux measurement using activated isotopes*. In: Progress in Nuclear Energy, **70**, January 2014, pp. 249-255.
- Bortot, S., Lorenzi, S., Ponciroli, R., Cammi, A., Della Bona, A., Juarez, N.B., 2013. *Stability analyses for the European LFR Demonstrator*. In: Nuclear Engineering and Design, **265**, December 2013, pp. 1238-1245.
- Lorenzi, S., Bortot, S., Cammi, A., Ponciroli, R., 2013. *Development of a Control-Oriented Simulator for a LFR demonstrator*. In: Nuclear Engineering and Design, **262**, September 2013, pp. 319-339.
- Cammi, A., Ponciroli, R., Borio di Tigliole, A., Magrotti, G., Prata, M., Chiesa, D., Previtali, E., 2013. *A Zero Dimensional Model for Simulation of TRIGA Mark II Dynamic Response*. In: Progress in Nuclear Energy, **68**, September 2013, pp. 43-54.

- Lorenzi, S., Cammi, A., Bortot, S., Ponciroli, R., Moiseyev, A., 2013. *Analytical models for a small LFR core dynamics studies*. In: Nuclear Engineering and Design, **254**, January 2013, pp. 67-88.

TECHNICAL REPORTS

- Das, P., De Vos, M., Eiler, J., Fittipaldi, A., Glockler, O., Hidayatullah, H., Hines, W., Huang, X., Mossman, T., Park, J.Y., Ponciroli, R., Subki, H.M., Upadhyaya, B., Wood, R., 2015. *Instrumentation and Control Systems for Advanced Small Modular Reactors*. Draft IAEA Nuclear Energy Series under development, 2015.
- Cammi, A., Ponciroli, R., Lorenzi, S., 2013. *Preliminary Definition of The Control System Architecture*. Grant Agreement no. FP7-249668, LEADER (Lead-cooled European Advanced Demonstrator Reactor) project, DEL21-2013, Task 4.4, January 2013.
- Bortot, S., Cammi, A., Lorenzi, S., Ponciroli, R., 2011. *Development of a dynamic simulator for a LFR DEMO, Technical Report, XCIRTEN-LP3-000*, September 2011.