Claudio Perego

Curriculum Vitae

Birth	Lecco, Italy	2-22-1984
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Affiliations	Department of Chemistry and Applied Biosciences, Eidgenössische Technische Hochschule Zürich	Vladimir-Prelog-Weg 1-5/10 8093 Zürich (Switzerland)
	&	
	Institute of Computational Science, Università della Svizzera Italiana	Via Giuseppe Buffi 13 6900 Lugano (Switzerland)
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Research Experience

Postdoctoral Researcher: April 2013 - today

Institution: *Eidgenössische Technische Hochschule* Zürich, (Switzerland) & *Università della Svizzera Italiana*, Lugano (Switzerland)
Scientific Advisor: M. Parrinello

Education

Ph.D., Physics: January 2010 - January 2013

Institution: *Università degli Studi di Milano-Bicocca*, Milano (MI), Italy
Thesis Title:

"Target Normal Sheath Acceleration for Laser-Driven Ion Generation: Advances in Theoretical Modeling"

Advisor: D. Batani, Co-Advisor: M. Passoni
Graduation Date: January, the 21st, 2013

M.Sc., Physics: November 2006 - July 2009

Institution: *Università degli Studi di Milano-Bicocca*, Milano (MI), Italy
Final Grade: 110/110 Magna cum Laude
Thesis Title:

"String Effects in Lattice Gauge Theories"

Advisor: G. Marchesini
Graduation Date: July, the 8th, 2009

B.Sc., Physics: October 2003 - November 2006

Institution: *Università degli Studi di Milano-Bicocca*, Milano (MI), Italy
Final Grade: 110/110 Magna cum Laude
Thesis Title:

"Study of Ultra-Short laser pulse propagation in Non-Linear Optical Fiber"

Advisor: D. Batani
Graduation Date: November, the 17th, 2006

Research Activity

Computational physics, Molecular Simulations, Enhanced Sampling, Statistical Mechanics, Laser-Plasma Physics.

My activity as a post-doc researcher is mainly focused on classical Molecular Dynamics calculations, aiming at the development and application of advanced sampling techniques for complex systems such as liquids and crystals. I have developed a method for the simulation of chemical processes in solutions at constant chemical potential and an enhanced sampling approach for the computation of the excess chemical potential of dense liquids. Moreover I have gathered experience in the molecular dynamics simulation of crystal nucleation and growth in solution.
During my PhD studies I have worked in the field of laser-plasma physics, proposing a thesis on the theoretical modelling of the laser-driven ion acceleration phenomenon. As a result I have contributed to the development of an analytical predictive model for the energies of the accelerated particle beams.
During my master degree on theoretical physics I have focused my research on Quantum Chromo-Dynamics and Lattice Gauge Theories, with a thesis on the development of a Lattice Monte-Carlo code for the study of static gluonic sources.
The different topics I have addressed during my research experience correlate through my strong interest in statistical physics and computational science.

Publications

M. Nava, F. Palazzesi, **C. Perego** and M. Parrinello, "Dimer Metadynamics" *Journal of Chemical Theory and Computation*, (2016) DOI: 10.1021/acs.jctc.6b00691.

C. Perego, F. Giberti and M. Parrinello, "Chemical Potential Calculations In Dense Liquids Using Metadynamics", *The European Physical Journal - Special Topics*, (2016) DOI: 10.1140/epjst/e2016-60094-x.

E. d'Hümières, J. Caron, **C. Perego** et al., "Preparation of the High Power Laser System PETAL for Experimental Studies of Inertial Confinement Fusion and High Energy Density States of Matter" *Journal of Physics: Conference Series*, Volume 688, Number 1, 012012 (2016).

C. Perego, M. Salvalaglio and M. Parrinello, "Molecular dynamics simulations of solutions at constant chemical potential" *The Journal of chemical physics*, Volume 142, Number 14, 144113 (2015), DOI: 10.1063/1.4917200.

M. Salvalaglio, **C. Perego**, F. Giberti, M. Mazzotti and M. Parrinello, "Molecular-dynamics simulations of urea nucleation from aqueous solution" *Proceedings of the National Academy of Sciences*, Volume 112, Number 1, E6-E14 (2015) DOI: 10.1073/pnas.1421192111.

M. Passoni, **C. Perego**, A. Sgattoni and D. Batani, "Advances in Target Normal Sheath Acceleration theory" *Physics of Plasmas*, Volume 20, 060701 (2013), DOI: 10.1063/1.4812708.

D. Batani, S. Hulin, J.E. Ducret, E. d'Humières, V. Tikhonchuk **et al.**, "Development Of The Petal Laser Facility And Its Diagnostic Tools" *Acta Polytechnica*, Volume 53, Issue 2, 103-109 (2013).

C. Perego, D. Batani, A. Zani and M. Passoni, "Target normal sheath acceleration analytical modeling, comparative study and developments" *Review of Scientific Instruments*, Volume 83, Issue 2, 02B502 (2012), DOI: 10.1063/1.3666188 .

C. Perego, A. Zani, D. Batani and M. Passoni, "Extensive comparison among Target Normal Sheath Acceleration theoretical models", *Nuclear Instruments and Methods in Physics*

Research A, Volume 653, Issue 1, p. 89-93 (2011), DOI: 10.1016/j.nima.2011.01.100-

H. J. Kbashi, H. Jawad, K. A. Al-Naimee, R. Benocci, P. Carpeggiani, **C. Perego** and D. Batani, "Spectral Width Variation of Ultrashort Laser Pulses in Monomode Optical Fibers", *Journal of Nonlinear Optical Physics & Materials*, Volume 18, Issue 3, pp. 541-542 (2009), DOI: 10.1142/S0218863509004774.

Conference &Workshop Contributions

C. Perego, M. Salvalaglio and M. Parrinello, "Molecular Dynamics of Crystal Growth at Constant Chemical Potential."
2015 Marvel Review and Retreat,
Lausanne, Switzerland, September 2015.

C. Perego, M. Salvalaglio and M. Parrinello, "Molecular Dynamics Simulations of Crystal Growth at Constant Chemical Potential."
6^{th} *Mainz Materials Simulation Days 2015 - Non-Equilibrium Processes in Soft Matter*,
Mainz, Germany, June 2015.

C. Perego, M. Salvalaglio and M. Parrinello, "Urea Crystal Growth at Constant Chemical Potential."
Molecular Simulations of Crystallization from Solution,
Lugano, Switzerland, May 2014.

C. Perego, D. Batani and M. Passoni, "TNSA theoretical modeling developments: ion cut-off energy dependence on target thickness and transverse size."
39^{th} *Conference on Plasma Physics, European Physical Society*,
Stockholm, Sweden, July 2012.
Awarded with PPCF/EPS Student Poster Prize.

2^{nd} *Dresden Exchange on Laser-Plasma Interaction Theory*,
Max-Planck-Institut für Physik komplexer Systeme,
Dresden, Germany, April 2012.

2^{nd} *HiPER Participants' Forum & Fellows Meeting*,
Hôtel de la Région, Bordeaux, France, February 2012.

C. Perego, D. Batani, A. Zani and M. Passoni, "Target Normal Sheath Acceleration analytical modeling, comparative study and developments."
14^{th} *International Conference on Ion Sources*,
Giardini Naxos, ME, Italy, September 2011.

C. Perego, M. Veltcheva, D. Batani and M. Passoni, "Target Normal Sheath Acceleration effective modeling study."
38^{th} *Conference on Plasma Physics, European Physical Society*,
Strasbourg, France, June 2011.

C. Perego, A. Zani, D. Batani and M. Passoni, "Extensive comparison among Target Normal Sheath Acceleration theoretical models."
4^{th} *International Conference on Super-Strong Fields in Plasmas*,
Varenna, LC, Italy, October 2010.

International Schools

Psi-k/Cecam/CCP9 *Biennial Graduate School in Electronic-Structure Methods*,
Oxford, United Kingdom, September 2013.

49^{th} *Course, Atoms and Plasmas in Super-Intense Laser fields*,
Erice, TP, Italy, July 2011.

ERASMUS *Intensive Program: Ultrashort and Intense Laser Technology and Metrology*,
Université Bordeaux 1, Talence, December 2010.

19^{th} *Summer School of Parallel Computing*,
CINECA computation center, Casalecchio di Reno, BO, Italy, September 2010.

ERASMUS *Intensive Program: Applications of Electronics in Plasma Physics*,
Rethymno, Greece, June 2010.

Computer Skills

Algorithms and Methods: Experience in Markov Chain Monte Carlo development. Molecular Dynamics (Gromacs, Lammps) and Particle-In-Cell (Picls) codes employment. Usage and development of PLUMED library for enhanced sampling and free-energy calculations. High Performance computing experience.

Languages: Experience in C/C++ development. Use and manipulation of Fortran77 codes. Open MPI fundamentals acquired at "CINECA Summer School of Parallel Computing". Bash scripting and Awk usage.

Applications: Experience in data processing and representation, numerical and symbolic computation using Mathematica® and Matlab®. Visualization and analysis of molecular systems using VMD.

Operating Systems: Unix/Linux, Windows.

Language Skills

English: C1 level, both written and spoken.

French: B1 level written, B2 level spoken.