Curriculum Vitae

TYUKODI Botond

E-mail: **tyukodi.botond@gmail.com**
Skype ID: tyukodi.botond
Phone: *+40745172921*

Personal information

Date of Birth: 21st August 1988
Place of Birth: Marghita, Romania
Citizenship: Romanian
Languages: Hungarian (native), Romanian (C2, baccalaureate), English (C1), French (B2)

Education

2012 - **PhD.** position in cooperation between ESPCI Paris and UBB Cluj-Napoca
Thesis topic: Application of depinning models to dewetting and amorphous plasticity

2010 - 2012 **MSc.** degree in Computational Physics, Faculty of Physics, Babeş-Bolyai University, Cluj-Napoca (Grade: 10/10)

2007 - 2010 **BSc.** degree in Computational Physics, Faculty of Physics, Babeş-Bolyai University, Cluj-Napoca (Grade: 9.79/10)

2003 - 2007 **High School:** Octavian Goga National College, Marghita, profile of Mathematics and Informatics

Scholarships and awards

2013 - 2014 National Excellence Scholarship
2011 - 2014 Collegium Talentum Scholarship
2008 - 2012 KMEI (Hungarian University Federation of Cluj) Scholarship
2007 - 2012 University Scholarship
2007 - 2008 Petrom Romania Scholarship

2011 1st prize at Transylvanian Student Conference, participant on Hungarian Student Conference
2010 1st prize at Transylvanian Student Conference
2009 2nd prize at Transylvanian Student Conference

Professional Experience

2015. January – 2015 July: Visiting Scholar at Northeastern University, dept. of Mechanical and Industrial Engineering, Boston, USA

2014. July : Flowing Soft Matter Summer School, International Centre for Mechanical Sciences (CISM), Udine, Italy

2014. May : visiting Glass and Time at Roskilde University, Roskilde, Denmark

2014. June : Driven Disordered Systems workshop, Laboratoire Interdisciplinaire de Physique, Grenoble, France

2013. November : assisting in situ X-ray tomography measurements in phase separated glasses at the European Synchrotron Radiation Facility, Grenoble, France

2013. September : Summer School on Statistical Physics of Complex and Small Systems, IFISC, Palma de Mallorca, Spain

2012. September : Summer University on Fusion Plasma, Max-Planck Institute for Plasmaphysics, Munich, Germany

2011. July - September, November - December: research engineer position, laboratoire PMMH & Institut Langevin, ESPCI, Paris, France

2010. September - November: DAAD Simlab Scholarship Program, Technical University of Munich, Munich, Germany

2010. August: Mathematical Modeling, Nonlinear Dynamics, Stochastic and Complex Systems Summer School, Denmark Technical University, Copenhagen, Denmark

2008. May: International Workshop on Stochastic Phenomena Summer School, Cluj-Napoca, Romania

Research Projects Involved:

- Study of evaporation using a very basic experimental setup: using a digital balance and a glass of ethanol we proposed a method for obtaining an estimated value of the Boltzmann constant. This work has been published in European Journal of Physics. (with Z. Néda, UBB Cluj)

- Experimental and theoretical study of domain formation in ferrimagnetic garnets: using a device called «magnetic bubble apparatus » we investigated the magnetic domains' topology in varying magnetic field in ferrimagnetic thin layers. I also elaborated a kinetic Monte Carlo method with time dependent transition rates that returns well the domain topology and the magnetization hysteresis curve. A paper concerning our results has been published in Central European Journal of Physics. (with Z. Néda, UBB Cluj)

- Configurational Bias Monte Carlo method for the calculation of the chemical potential of long chain molecules : as a part of the *ms2* molecular simulation code I implemented a method which makes possible new particle insertion and hence chemical potential calculation even in very dense liquids of long molecules. (with Ekaterina Elts, TUM München)

- Theoretical and experimental study of the syncronization process of metronomes : we placed several metronomes on a freely rotating horizontal disc which ensured a global coupling among them. Installing a set of sensors connected to a computer we were able to automatically record the phases of the metronomes and extract data regarding their syncronization. In particular, I worked in the developement of the sensor-computer digital interface in order to record and display data in real-time. A theoretical model for the phenomena was elaborated which explains different aspects of this syncronization dynamics. Our results have been published in The European Physical Journal B. (with Z. Néda, Sz. Boda and A. Tunyagi, UBB Cluj)

- AFM and optical roughness measurement of silica surfaces : during this work we made attempts to improve roughness measurement of extremely smooth (RMS~0.2nm) silica surfaces. Measurements had to be pushed to their limit in order to obtain a quantitative statistical characterization of the roughness spectrum. The latter which is expected to result from the freezing of capillary waves at glass transition is of interest in optical bandgap fibre development since it controls the scattering loss. Besides, I also generated such (artificial) surfaces by computer in order to investigate the impact of the experimental procedure (number and size of AFM images) on the best obtainable quality of these statistical properties. (with G. Tessier and D. Vandembroucq, ESPCI Paris)

- Dewetting simulation of thin liquid layers on inhomogeneous solid surfaces : we developed and implemented a fast method to simulate the movement of the delimiting contour of large, flat droplets on rigid surfaces. Our model is inspired and similar to depinning-type models used for crack propagation study. Inhomogeneities of the substrate can easily be inserted into the model. Droplets can either break up or merge, therefore the method is very suitable for modelling complex contraction dynamics of liquid films. Since it does not involve the solution of any hydrodynamic equation, the computational effort is only proportional to the linear size of the droplet. We published this method in Physical Review E. (with Z. Néda, UBB Cluj)

- Numerical study of various depinning models in amorphous plasticity : deformation of amorphous materials can be described in terms of localized plastic transformations which appear in an intermittent manner (slip-like events). Currently we study the behavior of an amorphous material under load, the resulting avalanches and their dependence on the type of the elastic stress induced by a localized shear transformation and also the mechanical properties of strongly heterogeneous amorphous composite materials (with D. Vandembroucq, S. Patinet, ESPCI Paris ; C. Lemarchand, Roskilde University, Denmark ; C. Maloney, Northeastern University, Boston, USA)

Research Interests:

computational physics, simulation and modeling, statistical physics, complex systems, disordered materials and systems and fluctuations therein, out of equilibrium systems and glass transition, self organized criticality, interdisciplinary problems, optimization problems, high performance distributed computing, big data analysis.

Skills:

- programming languages: C/C++ and parallel computing with OpenMP, Python, Java
- basic database (SQL) management
- basics of machine learning
- digital electronics: basics of MCU programming (PIC and AVR), common interfacing protocols (UART, USART, RS232, SPI, 1-wire)
- experience in Atomic Force Microscopy and Optical Profilometry
- basics of X-ray tomography with synchrotron radiation
- experience in Monte Carlo and Molecular Dynamics simulation methods
- experience in common numerical, signal processing and data analysis methods
- driving license: categories A and B (2007)

Conferences:

2015. November: MRS conference, Boston, USA
2014. November: TIM14 conference, Timisoara, Romania (co-author of invited talk)
2014. August: Condensed Matter in Paris, Paris, France (poster)
2014. February: Journées de physique statistique, Paris, France (talk)
2012. November: TIM12 conference, Timisoara, Romania (talk)
2012. November: EME conference, Cluj Napoca, Romania (talk, in Hungarian)
2011. May: ETDK, Cluj Napoca, Romania (talk, in Hungarian)
2011. April: OTDK, Nyíregyháza, Hungary (talk, in Hungarian)
2010. May: ETDK, Cluj Napoca, Romania (talk, in Hungarian)
2009. May: ETDK, Cluj Napoca, Romania (talk, in Hungarian)

ISI Publications:

B. Tyukodi, Zs. Sárközi, Z. Néda, A. Tunyagi, E. Györke
"Boltzmann constant from a snifter"
European Journal of Physics 33, 455 (2012)

B. Tyukodi, I. A. Chioar, Z. Néda
"A kinetic Monte Carlo study for stripe-like magnetic domains in ferrimagnetic thin films"
Central European Journal of Physics 11, 487 (2013)

Sz. Boda, Z. Néda, B. Tyukodi, A. Tunyagi
"The rhythm of coupled metronomes"
The European Physical Journal B 86, 263 (2013)

B. Tyukodi, Y. Bréchet, Z. Néda
"Kinetic roughening of a soft dewetting line under quenched disorder – a numerical study"
Physical Review E 90, 052404 (2014)

B. Tyukodi, C. Lemarchand, J. Hansen, D. Vandembroucq
“Finite size effects in a model for plasticity of amorphous composites”
Physical Review E, 93, 023004 (2016)

B. Tyukodi, S. Patinet, D. Vandembroucq, S. Roux
“Depinning models of amorphous plasticity – a soft mode perspective” (2015, submitted)

B. Bresson, C. Brun, X. Buet, Y. Chen, M. Ciccotti, J. Gateau, G. Jasion, M. Petrovich, F. Poletti, D. J. Richardson, R. Sandoghchi, G. Tessier, B. Tyukodi, D. Vandembroucq
“The long memory of glass surfaces” (2016, in preparation)

Book:

Z. Néda, B. Tyukodi, Á-E. Kacsó
“Foundations of classical statistical mechanics” (2014, in Hungarian, ISBN 978-973-114-187-9)