VITALY A. SHNEIDMAN

Department of Physics
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EDUCATION:

B.S. Department of Theoretical Physics, Kharkov State University (with honors), 1980

Ph. D. Institute of Low-Temperature Physics, Ukrainian Academy of Sciences, 1987. Thesis:**"Nonstationary nucleation in 1-st order phase transitions"**. Advisors: Academician L.A. Shubenko-Shubin, Professor V.V. Slyozov (Official Reviewer)

Post-doctoral University of Arizona (Professor M.C.Weinberg); 1991-1992 research into theory of nucleation and phase transformation kinetics in glass-to-crystal transitions

PROFESSIONAL EXPERIENCE:

2007-... Department of Physics, NJIT. Senior University Lecturer. Joint appointment to the Graduate Program in Materials Science and Engineering. (from Sept., 2005)

1999-2007 Department of Physics, NJIT. Special Lecturer.

1994-1999 Department of Materials Science and Engineering. The University of Arizona. Research Assistant Professor.

1992-1994 Department of Theoretical Physics, The University of Augsburg (Germany). Visiting scientist.

1991-1992 Department of Material Science and Engineering, The University of Arizona. Senior Research Associate (postdoctoral).

1987-1991 Institute for Mechanical Engineering Ukrainian Academy of Sciences. Senior Research Associate (1990-1991). Research Associate (1987-1990).

TEACHING EXPERIENCE:

Introductory Physics: General Physics (Lectures and labs) at the Pima Community College, Tucson, AZ (1996-99, 7 semesters). Phys 105 and 111 (Mechanics), Phys 121 and 121 Honors (Electricity and Magnetism) at the Dept. of Physics, NJIT (Fall 1999 - Fall 2007); course supervisor in Phys 121 for 5 semesters.

Undergraduate Courses: PHYS 461/464 (Nuclear Physics and Engineering, Lect. and Labs) and PHYS 430 (Classical Mechanics) at the Dept. of Physics, NJIT (Fall 1999 and Fall 2000).

Graduate Courses: MtSE 655 (Diffusion and Solid State Kinetics), MtSE 702/719 (Physical Principles of Solid State Characterization) and Phys 788 (Applied Computational Methods in Physics and Materials Science) - 2001-2008; Phys 641 (Statistical Mechanics) - Spring 2005, 2007 & 2008; Phys 621 (Classical Electrodynamics) - Fall 2006 & 2007 at the Dept. of Physics, NJIT.

Selected lecture notes and course Web pages: http://web.njit.edu/∼vitaly/
see /HONORS121/notes121h.pdf (electricity) and Notes2.pdf (magnetism) or
/788/notes788.pdf (Phys/MtSE 788) and /641/notes641.pdf (Phys 641)

New course development: A *Mathematica*- and *C*-based Phys 788 "Applied computational methods" (a two-semester course) was developed in 2001-2002. MtSE 655 "Diffusion and Solid State Kinetics" and MtSE 719 "Physical Principles of Solid State Characterization" were developed, respectively, in 2001 and 2004. In Spring of 2006 Phys/MtSE 688 "Mathematical and Statistical Methods in Materials Science" was developed, and was offered in the Fall of 2006 & 2007.

RESEARCH INTERESTS:

- Kinetics of nonequilibrium 1-st order phase transitions. Nucleation.
- Statistical mechanics and thermodynamics of metastable systems.
- Relaxation dynamics and memory effects in systems with large viscosity.
  Glass transition.
- Dynamic properties of the interface. Crystallization in bulk systems and in thin films.
- Dynamics of Ising-type systems
- Random walk problems. Barrier crossing. Fokker-Planck equation.
- Time-dependent non-linear stochastic processes.
- Computational methods and large scale simulations

AWARDS:

The Alexander von Humboldt Research Fellowships (1992)

MEMBERSHIP: The American Physical Society

ORGANIZATIONAL ACTIVITY

Member of Organizing Committee for the IXth International Conference "Physics of Non-Crystalline Solids" (ICPNS-99). Chair of the "Nucleation" session. Guest Editor for the special issue of J. Non-Cryst. Solids.
Session Chair at several Intl. Nucleation Symposia, 2000, 2003, 2006.
Co-chair of the International Nucleation Symposium (as part of the 77th Colloid and Surface Science Symposium) in Atlanta, GA (2003).

REFEREEING

Physical Review A and B, Phys. Rev. Letters, Science, Physics Letters, Europhysics Letters, J. Chem. Physics, American Journal of Physics, J. Non-Cryst. Solids, Philosophical Magazine A & B, J. Cryst. Growth; book review for Kluwer Academic Publishers. Peer review of proposals for DOE and NSF. "Top 20 Reviewers in 2012" from JCP.

Bibliography

[1] V.A. Shneidman, Communication: On the diffusion tensor in macroscopic theory of cavitation, J. Chem. Phys. **147** (2017) 061101.

[2] V.A. Shneidman, *Time-dependent cavitation in a viscous fluid*, Phys. Rev. **E 94** (2016) 062101.

[3] V.A. Shneidman, *Communication: On nucleation statistics in small systems*, J. Chem. Phys. **141** (2014) 051101.

[4] V.A. Shneidman, *Early stages of Ostwald ripening*, Phys. Rev. **E 88** (2013) 010401 (Rapid Communication).

[5] V.A. Shneidman, *Time-dependent distributions in self-quenching nucleation*, Phys. Rev. **E 84** (2011) 031602.

[6] V.A. Shneidman, *Comment on "Comparison between solutions of the general dynamic equation and the kinetic equation for nucleation and droplet growth" [J. Chem.Phys.* ***130****, 014102 (2009)]*, J. Chem. Phys. **132** (2010) 047101.

[7] V.A. Shneidman, *Transformations of the distribution of nuclei formed in a nucleation pulse: Interface-limited growth*, J. Chem. Phys. **131** (2009) 164115.

[8] V.A. Shneidman, *Universal distributions generated in a nucleation pulse*, Phys. Rev. Lett. **101** (2008) 205702.

[9] V.A. Shneidman, *Heating rate effects in the transient nucleation problem*, J. Chem. Phys. **127** (2007) 41102. *Communication.*

[10] V.A. Shneidman and G. M. Nita, *Collapse of transient nucleation fluxes in a cold Ising ferromagnet*, Phys. Rev. Lett. **97** (2006) 065703.

[11] V.A. Shneidman, *Nucleation rates for high supersaturations*, Phys. Rev. Lett. **95** (2005) 115701.

[12] V.A. Shneidman and E.V. Goldstein, *Nucleation time lag at nano sizes*, J. Non-Cryst. Solids **351** (2005) 1512.

[13] V.A. Shneidman, *Branching of nucleation paths in a metastable lattice gas with Metropolis dynamics*, New Journal of Physics **7** (2005) 12, doi:10.1088/1367-2630/7/1/012.

[14] V.A. Shneidman and G.M. Nita, *On the critical cluster in the two-dimensional Ising model: Computer-assisted exact results*, J. Chem. Phys. **121** (2004) 11232.

[15] V.A. Shneidman, *On the lowest energy nucleation path in a supersaturated lattice gas*, J. Stat. Phys. **112** (2003) 293.

[16] V.A. Shneidman and G. Nita, *Nucleation preexponential in dynamic Ising models at moderately strong fields*, Phys. Rev. **E 68** (2003) 021605.

[17] V.A. Shneidman, *Asymptotic relations between time-lag and higher moments of transient nucleation flux*, J. Chem. Phys. **119** (2003) 12487.

[18] V.A. Shneidman and G.M. Nita, *Modulation of the nucleation rate pre-exponential in a cold Ising system*, Phys. Rev. Lett. **89** (2002) 25701.

[19] V.A. Shneidman and R.K.P. Zia, *Wulff shapes and the critical nucleus on a two-dimensional hexagonal lattice*, Phys. Rev. **B 63** (2001) 085410.

[20] V.A. Shneidman, *Transient nucleation distributions and fluxes at intermediate times and sizes*, J. Chem. Phys. **115** (2001) 8141.

[21] V.A. Shneidman, K.A. Jackson and K.M. Beatty *Non-equilibrium interface of a two-dimensional low-temperature crystal.* - J. Crys. Growth. **212** (2000) 564.

[22] V.A. Shneidman, *Comment on "noncoarsening origin of logarithmic-normal size distributions during crystallization of amorphous thin films"*, Phys. Rev. Lett. **83** (1999) 2682.

[23] V.A. Shneidman and D.R. Uhlmann. *Quenching of a Brownian oscillator.* Phys. Rev. E, **59** (1999) 3954.

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[26] V.A. Shneidman. *Analytical description of "athermal" nucleation and its relevance to rapidly quenched fluids.* J. Appl. Phys. **85**, 1981 (1999).

[27] V.A. Shneidman, K.A. Jackson and K. M. Beatty, *On the applicability of the classical nucleation theory in an Ising system.* J. Chem. Phys. **111**, 6932 (1999).

[28] V.A. Shneidman and D.R. Uhlmann. *The fast quench/heating rate effects in devitrification of glasses. I. Number of nucleated particles.* J. Chem. Phys. **108**, 1094 (1998).

[29] V.A. Shneidman and D.R. Uhlmann. *Crystalization of a glass-forming melt with retarded viscosity.* J. Non-Cryst. Solids **223**, 48 (1998).

[30] V.A. Shneidman. *Transient solution of the Kramers problem in the weak noise limit.* Phys. Rev. E **56**, 5257 (1997).

[31] V.A. Shneidman and D.R. Uhlmann. *Does a Lennard-Jones glass exist?* J. Non-Cryst. Solids. **224**, 86 (1998). Letter to the Editor.

[32] V.A. Shneidman and D.R. Uhlmann. *The fast quench/heating rate effects in devitrification of glasses. II. Crystallization kinetics.* J. Chem. Phys. **109** (1), 186 (1998).

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[35] M.C.Weinberg, V.A.Shneidman, and Z.Osborne, *On the composition of the critical nucleus in phase separating glasses.*- Phys. Chem. Glasses **37**, 49 (1996).

[36] V.A. Shneidman, *Interplay of latent heat and time-dependent nucleation effects following pulsed laser melting of a thin silicon film.*- J. Appl. Phys. **80**, 803 (1996).

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[40] V. A. Shneidman, *Time-dependent nucleation during reheating of a rapidly quenched glass.*- J. Chem. Phys. **102**, 1791 (1995).

[41] V.A. Shneidman, *Theory of time-dependent nucleation and growth during a rapid quench.*- J. Chem. Phys. **103**, 9772 (1995).

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[43] V.A.Shneidman and P.Hänggi, *Continuous approximation of a random walk.*- Phys. Rev. **E49**, 894 (1994).

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[53] V.A.Shneidman and M.C.Weinberg, *Transient nucleation induction time from the birth-death equations.*- J. Chem. Phys. **97**, 3629 (1992).

[54] V.A.Shneidman, *Dynamics of an Ising ferromagnet at $T = T_c$ from the droplet model approach* - Physica **A190**, 145 (1992).

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[66] V.A.Shneidman, *The kinetics of first order phase transitions. Nonstationary many-parameter nucleation.* - Sov. Phys. JETP **64(2)**, 306 (1986).

ORAL PRESENTATIONS

Invited Talks:

- General Meeting of the American Physical Society. Los Angeles, CA. 1998.
- 18th International Glass Congress. San Francisco, CA. 1998.
- MRS Spring Meeting in San Francisco, CA. 2004.
- 80th Colloid and Surface Science Symposium, Boulder, CO, June 2006.
- 8th Intl Symp. on Crystallization in Glasses and Liquids. Jackson Hole, WY, Sept. 2006.
- XII Conf. on the Physics of Non-Cryst. Solids and 9th Intl. Symp. on Crystallization in Glasses and Liquids. Iguacu Falls, Brazil, Sept. 2009.

International Conferences:

International Congress on Nucleation and Crystallization. Atlanta, GA. 1992.
13th, 15th and 17th Intl Conf. on Nucleation and Atmospheric Aerosols. Salt Lake City, UT. 1992, Rolla, MO. 2000 and Galway, Ireland 2007.
13th General Conference of the Condensed Matter Division of the European Physical Society, Regensburg, Germany. 1993.

The Lars Onsager Symposium "Coupled Transport Processes and Phase Transitions". Trondheim, Norway. 1993.
14th General Conf. of the Cond. Mat. Division of the European Physical Society. Madrid, Spain. 1994.
IXth Intl. Conf. "Physics of Non-Crystalline Solids", Tucson, AZ, 1999.
The Seventh Intl Symp. on Crystallization in Glasses and Liquids, Sheffield, UK, 2003.
18th ICNAA, Prague, 2009.
The Nucleation Symposium (part of 85th Colloid and Surface Science Symposium), Montreal, 2011.
19th ICNAA, Ft. Collins, Co. 2013.
ICNAA 2017, Helsinki.

Seminars and Symposia:
Department of Mathematics, University of Arizona. 1996 and 1999.
Institute for Theoretical Physics, The University of Augsburg, Germany. 1993.
Joint Seminar of the Nordita Institute for Theoretical Physics and the University of Copenhagen. 1993
Arizona Days at Los Alamos, Center for Non-Linear studies, Los Alamos. 1996.
Department of Mathematics, University of California at Irvine, 1998.
Department of Physics, New Jersey Institute of Technology, 2000 and 2001.
Nucleation Symposium, Stanford, CA, 1994, State College, PA, 1998 and Atlanta, GA, 2003.
82d, 83d, 85th, 87th, 88th, 91st, 94th and 95th Statistical Mechanics Conferences,
Rutgers University, NJ, 1999-2006
Physics Department, Yeshiva University, New York, NY, 2005.
Courant Institute of Mathematical Sciences, New York, NY, 2007.
Department of Mathematics, MIT, Boston, MA 2007.
Department of Mathematics, UCI, Irvine, CA 2007, 2010.