Curriculum Vitae

ARMEN M. GULIAN **US Citizen**

18111 Highfield Rd., Ashton, MD 20861
phone: (202) 247-7996; E-mail: gulian@chapman.edu; also: gulian@hotmail.com

Key Specialty: Physics and Material Science of Superconductors (Theory and Experiment)
Education and Scientific Degrees:

MS *in Solid State Physics* (with honors): Higher School of Physics at Moscow Engineering Physics Institute, 1978

Ph.D. *in Theoretical & Mathematical Physics*: P.N. Lebedev Physics Institute, Moscow, 1981

Doctor *of Physical & Mathematical Sciences* (Soviet Degree, next above PhD), Moscow, 1990

Research Appointments:

2012-Current: Senior Research Scientist (Staff Member) at Chapman University

2009-2012: Senior Research Scientist (Contractor) at Chapman University

1996-2010: Senior Research Scientist (Contractor) at the US Naval Research Laboratory, Washington DC

1987-1996: Head of Laboratory of High-Temperature Superconductivity at the Physics Research Institute at National Academy of Sciences, Armenia

1981-1987: Researcher, Physics Research Institute, National Academy of Sciences, Armenia

Teaching Experience:

- Graduate courses in theoretical physics (Moscow Engineering-Physics Institute, Yerevan State University)
- Supervision of graduate research (three students defended PhD degrees)

Technical Skills in:

- X-ray/UV/IR detector physics and applications
- Sintering and characterization of novel materials
- Thin film deposition technologies (magnetron sputtering and laser ablation)
- Nanotube and nanowire characterization
- Cryogenics: superconductivity and superconducting electronics
- Thermoelectric materials: physics and application
- Electron Microscopy and Microanalysis (EDX and WDX)
- E-beam and Photo Lithography
- X-ray diffractometry and Thermogravimetry
- SQUID Magnetometry
- LabVIEW: digital data acquisition and processing
- MathCAD mathematical modeling

LIST OF PUBLICATIONS

1. Monographs

1.1. Gulian A.M. and Zharkov G.F. *Nonequilibrium electrons and phonons in superconductors*. (Kluwer Academic - Plenum, New York) 1999.
1.2. Gulian A.M. and Zharkov G.F. *Superconductors in external fields*. (Nauka, Moscow) 1990 (in Russian).

2. Chapters in collective monographs

2.1. Abramian Barco P. and Gulian A.M. Numerical solutions of Hawking's equations for gravitational waves in evolutionary universe. In: *Gravitational Waves: Explorations, Insights and Detection* (Nova Science Publishers, Inc., New York) 2016, in press.
2.2. Gulian A.M. and Melkonyan G.M. Cooling by heating: Deep cryogenic refrigeration by photons based on the phonon deficit effect in superconductors. In: *Recent Advancement in Superconductivity Research* (Ed. C.B. Taylor) (Nova Science Publishers, Inc., New York) 2013, pp. 29-54.
2.3. Gulian A.M. and Nikoghosyan V.R. Unusual properties of laser-processed strontium ruthenates. In: *Bulk Materials: Research, Technology and Applications*. (Nova Science Publishers, Inc., New York) 2010, pp. 349-392.
2.4. Gulian A.M., Zharkov G.F., and Sergoyan G.M. Time-dependent Ginzburg-Landau equations for superconductors with finite gap. In: *Nonstationary Phenomena and Fluctuations in Superconductors. Trudi FIAN*, vol. 204 (Nauka, Moscow) 1990, pp. 3-56 (in Russian).
2.5. Gulian A.M., Nersesyan O.N., and Sergoyan G.M. Electromagnetic and kinetic phenomena in superconductors and superfluid He-3. (*Ibid.*) pp. 57-112 (in Russian).
2.6. Gulian A.M. Zharkov G.F., and Sergoyan G.M. Dynamic generalization of Ginzburg-Landau equations. In: *Problems of Theoretical Physics and Astrophysics* (Eds. L.V. Keldysh and V.Ya. Fainberg) (Moscow, Nauka) 1989, pp. 145-164 (in Russian).
2.7. Gulyan A.M. and Zharkov G.F. The kinetics of nonequilibrium phonons and electrons in superconductors in a high-frequency electromagnetic field. In: *Thermodynamics and electrodynamics of superconductors* (Ed. V.L Ginzburg) (Nova Science, New York) 1988, pp.111-182.
2.8. Gulyan A.M. and Zharkov G.F. The kinetics of nonequilibrium electrons and phonons in superconducting tunnel junctions. In: *Nonequilibrium Superconductivity* (Ed. V.L.Ginzburg) (Nova Science, New York) 1988, pp. 1-56.

3. Properties of nonequilibrium superconductors and superfluid ^{3}He

3.1. Gulian A.M., Nersesyan H.N., and Paturyan S.V. Nonequilibrium states of charge carriers in superconductors: possibilities to create inverse population and initiate laser action. *Mod. Phys. Lett. B*, 1994, vol. **8**, No. 1, pp. 1-20.

3.2. Gulian A.M., Vartanian V.O. Experimental and theoretical investigation of photoinduced thermoelectric effect in high-temperature superconductors. *Physica C*, 1994, vol. **235 - 230**, pp. 1411-1412.
3.3. Gulian A.M. Time-dependent Ginzburg-Landau equations for finite-gap superconductors and the problem of paraconductivity. *Phys. Lett. A*, 1994, vol. **200**, No.2, pp. 201-204.
3.4. Galoyan N.A. and Gulian A.M. Thermoelectric power of superconductors in conditions of optically induced branch imbalance. *Mod. Phys. Lett. B*, 1994, vol. **8**, No. 8-9, pp. 509-515.
3.5. Galoyan N.A. and Gulyan A.M. On thermoelectric effect in superconductors at electron-hole branch imbalance // Superconductivity, 1994, vol. **7**, No. 2, pp. 237-240 (in Russian).
3.6. Gulian A.M., Nersesyan H.N., and Paturyan S.V. On distributions of nonequilibrium electron quasiparticles in anisotropic superconductors with non-Debye phonon spectrum. *Phys.Lett. A*, 1994, vol. **184**, No. 2, pp. 218-222.
3.7. Gulyan A.M. and Nersesyan O.N. Phonon-pumped nonequilibrium states in superfluid He-3. *Sov. Phys.-JETP*, 1989, vol.**68**, No. 4, pp. 756-762.
3.8. Gulyan A.M. and Mkrtchyan V.E. Stimulation of superconductivity by electromagnetic radiation. *Sov. Phys. - Lebedev Inst. Reports*, 1989, No. 2, pp. 40-44.
3.9. Gulian A.M., Nersesyan H.N., and Sergoyan G.M. Possible "photon" instability of high-temperature nonequilibrium superconductor. *Sov. Phys. - Doklady*, 1989, vol.**34**, No.2, pp. 153-154.
3.10. Gulian A.M., Zharkov G.F., and Sergoyan G.M. Interference current in nonequilibrium superconductors. *Sov. Phys. JETP*, 1987, vol. **65**, No. 1, pp. 107-111.
3.11. Gulian A.M., Zharkov G.F., and Sergoyan G.M. Effect of the order parameter dynamics on the phonon emission in superconductors. *JETP Letters*, 1986, vol. **44**, No. 7, pp. 426-429.
3.12. Gulyan A.M. Paramagnons in imbalanced He-3-A, *Sov. Phys. - Lebedev Inst. Reports*, 1986, No. 9, pp. 45-49.
3.13. Gulyan A.M., Zharkov G.F., and Sergoyan G.M. Acoustical vibrations of a barrier in a superconducting tunnel contacts. *Sov. Phys. - Lebedev Inst. Reports*, 1986, No. 4, pp.41-46.
3.14. Gulyan A.M., Zharkov G.F., and Sergoyan G.M. Dynamic Ginzburg-Landau equations and the calibration invariance of a charge. *Sov. Phys. - Lebedev Inst. Reports*, 1986, No.10, pp. 69-75.
3.15. Gulyan A.M. and Zharkov G.F. Electron and phonon kinetics in a nonequilibrium Josephson junction. *Sov. Phys. JETP*, 1985, vol. **62**, No.1, pp. 89-97.
3.16. Gulian A.M., Zharkov G.F., and Sergoyan G.M. Thermal balance in the tunnel contact of a superconductor. *Sov. Phys. - Lebedev Inst. Reports*, 1985, No.10, pp. 38-42.
3.17. Gulyan A.M. and Zharkov G.F. Scattering of electromagnetic radiation by a nonequilibrium Josephson junction. *JETP Letters*, 1984, vol. **40**, No. 4, pp. 885-888.
3.18. Gulian A.M. and Zharkov G.F. Quantum oscillations of the nonequilibrium chemical potential in Josephson junction. *Phys. Lett. A*, 1984, vol. **103**, No. 5, pp. 283-285.
3.19. Gulyan A.M. and Zharkov G.F. Contribution to the theory of acoustic quantum generators based on nonequilibrium superconductors. *Sov. Phys. JETP*, 1983, vol. **57**, No. 5, pp. 1059-1065.

3.20. Gulyan A.M. and Zharkov G.F. Nonequilibrium kinetics of electrons and phonons in superconductors in intense UHF-fields. *J. Low Temp. Phys*., 1982, vol. **48**, No. 1/2, pp.125-150.
3.21. Gulyan A.M. and Zharkov G.F. Kinetics of phonons in nonequilibrium superconductors at external electromagnetic field. *Sov. Phys. JETP*, 1981, vol. **53**, No. 1, pp. 154-165.
3.22. Gulyan A.M. and Zharkov G.F. Phonon deficit effect in superconductors in a strong microwave field. *JETP Lett*., 1981, vol. **34**, No. 4, pp. 153-157.
3.23. Gulyan A.M. and Zharkov G.F. Temperature dependence of superconducting gap in a strong microwave field. *JETP Lett*., 1981, vol. **33**, No. 9, pp. 454-458.
3.24. Gulian A.M. and Zharkov G.F. The "phonon deficit" effect in superconductors induced by UHF radiation. *Phys. Lett. A*, 1980, v.**80**, No. 1, pp. 79-80.
3.25. Gulian A.M. and Zharkov G.F. On thermoelectric effect in superconducting ring. In: *Thermoelectricity in Metallic Conductors* (Eds. J. Blatt and P.A. Shroeder) (New York, Plenum Press) 1978, pp. 189-193.
3.26. Gulian A.M. Superconducting tunnel junction as possible source of coherent photon and phonon generation. *Appl. Supercond*., 1994, vol.**2**, No.10-12, pp.721-728.
3.27. Gulyan A.M. On the inverse population in the nonequilibrium state of superconductors under optical pumping. *Sov. J. low Temp*., 1992, vol. **18**, No. 10, pp. 817-818.
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3.29. Gulian A.M., Microrefrigeration and the phonon deficit effect. *Physica B*, 1999, vol. **263**, pp. 621-623.
3.30. Melkonyan G., Gulian A.M., and Kroger H. Nonequilibrium superconductor-normal metal tunnel contact and the phonon deficit effect. *Physica B*, 2000, vol. **284**, part 2, pp. 2032-2033.

4. Physics of high-temperature superconductors

4.1. Abramyan P.B., Gulyan A.M., Kuzanyan A.S., Petrosyan A.G., Ter-Mikaelyan M.L., and Shirinyan G.O. Physical properties of high-temperature superconductor. *JETP Lett*., 1987, vol. **46**, Suppl., pp. S188-S190.
4.2. Abramyan P.B., Gevorkyan A.V., Glushko B.A., Gulian A.M., Kuzanyan A.S., Petrosyan A.G., and Sarkisyan G.S. Laser deposition and properties of high-temperature superconducting films. *Proc. 7-th All-Union Conference on Crystal Growth: Symposium on Molecular-Beam Epitaxy*, 1988, vol.**2**, pp. 374-375.
4.3. Ganapetyan V.M., Gevorgyan S.G., Gulian A.M., Pilosyan S.Kh., and Ter-Mikaelian M.L. Some physical properties of high-temperature superconducting films. *Proc. of Beijing International Conference on High-Temperature Superconductivity*. (Eds. Z.X.Zhao, G.J.Cui, and R.S.Han). (World Scientific, Singapor) 1990, pp. 394-396.
4.4. Gulian A.M., Mkrtchyan V.E., and Nersesyan H.N. Once again on superconductivity enhancement by electromagnetic radiation. (*Ibid.*), pp. 255-257.
4.5. Abramyan P.B., Kuzanyan A.S., Paronyan T.M., Terzyan S.S., and Gulian A.M. The effect of dopants and Bi-nonstoichiometry on superconducting properties of $Bi_{(1.7)}$ $Pb_{(0.3)}$ $Sr_{(2)}$ $Ca_{(2)}$ $Cu_{(3)}$ $O_{(y)}$. (*Ibid.*). pp. 216-218.

4.6. Avagyan A.A., Akopyan R.B., Gulian A.M., Vartanyan V.O., Pilosyan S.Kh., and Terzyan S.S. Simple methods of high Tc Y-Ba-Cu-O and Bi-Pb-Sr-Ca-Cu-O thin film preparation. (*Ibid.*) pp. 124-125.

4.7. Akopyan R.B., Gevorgyan S.G., Gulyan A.M., and Pilosyan S.Kh. Physical properties of high-temperature superconducting films. In: *High-Temperature Superconductors: Proc. of Satellite Symposium 4 on 7-th CIMTEC - World Ceramics Congress*. Trieste, Italy, 1990 (Ed. P. Vinchenzini), Elsevier, 1991, pp. 451-453.

4.8. Gulian A.M. and Nersesyan H.N. On a model of high-temperature superconductors. *Sov. Low Temp. Phys.*, 1991, vol. **17**, No. 9, pp. 564-566.

4.9. Badalyantz G.R., Gulyan A.M., Kuzanyan A.M., Pilosyan S.Kh., Terzyan S.S., and V.A.Shindyan. Superconducting large-diameter films on Si-substrates. *Izvestiya NAN Armenii*, 1993, vol. **28**, No. 3-4, pp. 174-177 (in Russian).

4.10. Gulian A.M. and VanVechten D., Possible three terminal HTS transistor device. *IEEE Trans. Appl. Supercond.*, 1997, vol. **7**, No.2, part 3, pp. 3096-3098.

4.11. Vardanyan V.O., Gyulamiryan A.L., and Gulian A.M., On nature of an anomalous peak in thermopower of $YBa_2Cu_3O_{7-\delta}$ thin films. *Physica B*, 2000, vol. **284**, part 1, pp. 1005-1006.

4.12. Gulian A.M. and Harutyunyan A.R. On sigma-delta anticorrelation in high-temperature superconductors. *Phys. Lett. A*, 2009, **373**, No. 37, pp.3392-3394.

4.13. Gulian M., Melkonyan G., and GulianA. Engineering room-temperature superconductors via ab-initio calculations. *Phys. Procedia*, 2015, **67**, pp. 963 – 969.

4.14. Gulian A., Nikoghosyan V., Tollaksen J., Vardanyan V., Kuzanyan A. Current-biased transition-edge sensors based on re-entrant superconductors. *Phys. Procedia* 2015, **67**, pp. 834 – 839

5. Physics of cryogenic detectors

5.1. Van Vechten D., Wood K.S., Fritz G. G., Daly G. M., Thrasher J. B., Photiadis D. M., Ding. J., Pinto J. F., Blamire M. G., Burnell G., Gyulamiryan A. L., Vartanyan V. H., Akopyan R. B., and Gulian A.M., Voltage responses to optical pulses of unbiased normal and superconducting samples. *Appl. Phys. Lett*., 1997, vol. **71**, No.10, pp.1415-1417.

5.2. Van Vechten D., Wood K., Koller D., Gulian A.M. and Nikogosyan V. R., High-energy photon absorption in superconductors results in branch imbalance potential. *IEEE Trans. Appl. Supercond.*, 1997, vol. **7**, No.2, pp.3419-3421.

5.3. Gulian A.M. and D.Van Vechten. Electron-hole imbalance in superconductors initiated by absorption of high-energy quanta. *Mod. Phys. Lett. B*, 1996, vol. **10**, No.8, pp.329-338.

5.4. Gulian A.M. and D.Van Vechten. Cascade modeling in superconductors: production, registration and implications of branch imbalance potential. *Nucl. Instr. & Meth. A*, 1996, vol.**370**, pp.107-109.

5.5. Van Vechten D., Porter F.S., Wood K.S., and Gulian A.M. Alternative non-equilibrium superconducting x-ray detectors. *Nucl. Instr. & Meth. A, 1996*, vol. **370**, pp.34-37.

5.6. Gulian A.M. and D.Van Vechten. Nonequilibrium dynamic conductivity of superconductors: an exploitable basis for high energy resolution x-ray detectors. *Appl. Phys. Lett*., 1995, vol.**67**, No.17, pp.2560-2562.

5.7. Gulian A., Wood K., Fritz G., Gyulamiryan A., Nikogosyan V., Giordano N., Jacobs T., and Van Vechten D, X-ray/UV single-photon detectors with isotropic Seebeck sensors. *NIMA*, 2000, vol. **444**, pp. 232-236.

5.8. Van Vechten D., Wood K., Fritz G., Horwitz J., Gyulamiryan A., Kuzanyan A., Vartanyan V., and Gulian A, Imaging detectors based on anisotropic thermoelectricity. *NIMA*, 2000, vol.**444**, pp. 42-45.

5.9. Fritz G.G., Wood K.S., Van Vechten D., Gyulamiryan A.L., Kuzanyan A.S., Giordano N.J., Jacobs T.M., Wu H.-D., Horwitz J.S., and Gulian A.M., Thermoelectric single-photon detectors for X-ray/UV radiation. *Proc. SPIE*, 2000, vol. **4140**, pp. 459-469.

5.10. Harutyunyan S.R., Vardanyan V.H., Kuzanyan A.S., Nikoghosyan V.R., Kunii S., Winzer K., Wood K.S., and Gulian A.M., Thermoelectric cooling at cryogenic temperatures. *Appl. Phys. Lett*., 2003, vol. **83**, No. 11, pp. 2142-2144.

5.11. Wood K.S., Fritz G.G., Van Vechten D, and Gulian A.M., QV sensors: Energy resolving, single-photon microcalorimeters for biasless detection, based on cryogenic thermoelectric sensors. *Invention Disclosure* (US Patent, 2003)

5.12. Gulian A., Wood K., Van Vechten D., et al., Current developmental status of thermoelectric (QVD) detectors. *NIMA*, 2004, vol. **520**, No1-3, pp. 36-40.

5.13. Wood K., Van Vechten D., Fritz G., et al., Toward ultimate performance limits of thermoelectric (QVD) detectors. *NIMA*, 2004, vol. **520**, No. 1-3, pp. 56-59.

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5.15. Wood K., Gulian A., Ray P., QVD Sensors as Focal Plane Instruments for X-ray Timing Applications. *X-Ray Timing* 2003: Rossi and Beyond (Eds. Kaaret P., Lamb F., and Swank J.H.), *APS Conf. Proc*., 2004, vol. **714**, pp.447-450.

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5.19. Carlsson M., Garcia-Garcia F.J., Johnsson M., and Gulian A., Synthesis of $La_xCe_{1-x}B_6$ whiskers *J. Mater. Sci*., 2005, vol. **40**, pp.2991-2994.

5.20. Gulian A., Foreman J., Nikoghosyan V., Nussinov S., Sica L, and Tollaksen J. "Spaghetti" design for gravitational wave superconducting antenna. *J. Phys. Conf. Ser*., 2014, **507**, 042013.

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6. Nonlinear optics

6.1. Bashkansky M., Walker D., Gulian A. and Steiner M., SBS-based Radar True Time Delay. *Advances in slow and fast light IV* (Eds.: Shahriar, S.M. and Hemmer, P.R.): *Proceedings of SPIE*, vol. **7949**, 2011, Article # 794918.

6.2. Walker D., Steiner M. and Gulian A., Analysis of an all-optical SBS avalanche detector. *Advances in slow and fast light III* (Eds.: Shahriar, S.M. and Hemmer, P.R.): *Proceedings of SPIE*, vol. **7612**, 2010, Article # 761203.

6.3. Bashkansky M., Dutton Z , Gulian A , Walker D., Fatemi F, Steiner, M., True-time delay steering of phased array radars using slow light. *Advances in slow and fast light II* (Eds.: Shahriar S.M., Hemmer P.R. and Lowell J.R.): *Proceedings of SPIE*, vol. **7226**, 2009, Article # 72260.

6.4. Walker D.R., Bashkansky M., Gulian A., Fatemi, F.K., Steiner M., Stabilizing slow light delay in stimulated Brillouin scattering using a Faraday rotator mirror. *J.Opt. Soc. Am., B-Opt. Phys.*, 2008,vol. **25**, No.12, pp.C61-C64.

7. Quantum devices

7.1. Gulian A.M. and Wood K.S., Triplet superconductors as the basis for solid-state quantum computing. *J. Optics B*, 2003, Vol. **5**, No.6: pp. S619-S626.

7.2. Gulian A.M., Wood K.S., Triplet superconductors from the viewpoint of basic elements for quantum computers. *IEEE Trans. Appl. Supercond*., 2003, vol. **13**, part1, No. 2, pp. 944-947.

7.3. Gulian A.M. and Wood K.S., Ruthenates: simple superconducting qubits. *Physica C*, 2004, vol. **408-410**, pp.923-925.

7.4. Wood K.S., Horwitz J.S., Wu H.-D., Bounnak S.S., Yaguchi H., Maeno Y., and Gulian A. Toward nano-fabrication of superconducting ruthenate qubits. *Physica C*, 2004, vol. **408-410**, pp.928-929.

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7.7. Melkonyan G., Gulian A. Prospective solid-state photonic cryocooler based on the "phonon-deficit effect". *Phys. Procedia*, 2015, **67**, pp 1187 – 1192.

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