Shixian Liu

Email: sxliu98@gmail.com Website: www.sxliu.site

Profile: **Ph.D. Candidate**, specializing in **micro- and nanoscale heat conduction**, phonon transport, machine learning, and Monte Carlo simulations.

Programming Skills: Matlab, Python, Fortran Computational Tools: VASP, QE, phono3py, ShengBTE

Professional Experience

Bauman Moscow State Technical University, Dept. of Thermophysics, *Assistant* 09.2025 – Present

- Teaching the graduate core course *"Thermalphysics of Nano-Systems"*.
- Assisting in teaching the general course *"Mathematical Modeling of Physical Problems"*, focusing on Python and machine learning.

Education

Bauman Moscow State Technical University, *Ph.D. Candidate* 09.2023 – Present

- Thermal Physics and Theoretical Heat Engineering (CSC International Cooperation Program)

Bauman Moscow State Technical University, *M.Sc.* 09.2021 - 07.2023

- Nuclear Power and Thermal Physics (CSC International Cooperation Program)

Moscow Power Engineering Institute, *B.Sc.* 09.2019 - 07.2021

- Nuclear Power and Thermal Physics (CSC Outstanding Undergraduate International Exchange Program)

North China Electric Power University, *B.Sc.* 09.2017 - 07.2021

- Nuclear Engineering and Nuclear Technology

Research Experience

Doctoral Research: Thermophysical Properties and Regulation of Nanostructures 2023–2027

- Systematic investigation of quantum confinement effects on specific heat capacity of nanostructures at low temperatures, revealing microscopic mechanisms of anomalous heat capacity.
- Analyzed particle-like and wave-like contributions in phonon transport; proposed the novel concept of "resonance hybridization depth" to quantify coupling strength.
- Developed a 3D ensemble phonon Monte Carlo simulation code, applicable to chip thermal management problems in complex multi-boundary structures.

Publications

Journal Articles: 8 SCI publications (6 as first author)

1. **Liu S.**, Zhang G., Yin F., Barinov A.A., Khvesuk V.I., Yang N. Temperature Dependence of Specific Heat Capacity of Nanostructures via Neural Evolution Potential. *J. Appl. Phys.*, 2025. [Q2] [IF 2.5]
2. **Liu S.**[#], Zong Z.[#], Yin F., Khvesuk V.I., Yang N. Quantifying Particle and Wave Effects in Phonon Transport of Pillared Graphene Nanoribbons. *Int. J. Therm. Sci.*, 2025, **217**, 110067. [Q1] [IF 5.0]
3. **Liu S.**, Khvesuk V.I. Temperature Fluctuations in Quantum Dots: Insights from a T3/2 Heat Capacity Model. *Phys. Lett. A*, 2025, **534**, 130261. [Q2] [IF 2.6]
4. **Liu S.**, Yin F., Khvesuk V.I. Investigating Anisotropic Three-Phonon Interactions in Graphene's Thermal Conductivity Using Monte Carlo Method. *Int. J. Thermophys.*, 2025, **46**(2), 22. [Q2] [IF 2.9]
5. **Liu S.**, Barinov A.A., Yin F., Khvesuk V.I. Determination of Thermal Properties of Unsmooth Si Nanowires. *Chin. Phys. Lett.*, 2024, **41**(1), 016301. [Q1] [IF 4.2]
6. **Liu S.**, Yin F., Melikhov V.I., Melikhov O.I. Validation of the STEG Code Using Experiments on Two-Phase Flow Across Horizontal Tube Bundles. *Nucl. Eng. Des.*, 2022, **399**, 112048. [Q1] [IF 2.1]
7. Yin F., **Liu S.**, Barinov A.A., Khvesuk V.I. An Enhanced Framework for Wave Reflection from a Periodically Rough Boundary. *Phys. B: Condens. Matter.*, 2025, **716**, 417743. [Q2] [IF 2.8]
8. Zhou Z., He Y., **Liu S.**, Yang L., Yang N. Effect of Non-Fourier Heat Transport on Temperature Distribution in High Bandwidth Memory. *IEEE Trans. Electron Devices*, 2025. [Q2] [IF 3.2]

Other Achievements: Participated in 10+ international conferences (Russia, China, Belarus).