

Ruizhe Kang

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EDUCATION BACKGROUND

- **Department of Physics, Nanjing University (NJU)** Sept 2014 – Jun 2018 (expected)
Bachelor of Science in Physics (Specialty Physics Program)
GPA (overall): **4.64/5.0**; Ranking: **2/159 (top 2%)**
- **School of Engineering and Applied Science (SEAS), Harvard University**
Visiting Research Student Aug 2017 – Jan 2018

Related Courses:

Linear Algebra	97	Method of Mathematical Physics	94
Electrodynamics	94	Quantum Mechanics	95
Statistical Physics	99	Solid-State Physics	96
Physics of Phase Transitions (graduate course)	99	Computational Physics	95
Crystal Diffraction	98	College Chemistry	96
Mesoscale Materials	99	Computational Photonics	100

RESEARCH EXPERIENCES

❖ Harvard University, SEAS | Research Assistant

Advisor: **Xin Li** (Assistant Professor)

Project I: Fullerene Intercalated Graphite for Battery Cathode Aug 2017 – Present

- Applied electrochemical methods to synthesize fullerene intercalated graphite as a battery cathode due to its high ionic mobility and ionic storage ratio predicted by DFT calculations;
- Introduced alkali metal intercalations in fullerene intercalated graphite in order to induce possible superconductivity in this system.

Project II: Modification of $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$ as Battery Cathode Oct 2017 – Present

- Designed and set up experimental apparatuses for synthesizing high quality, commercial standard $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$ by the co-precipitate method;
- Modified spherical $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$ particles with high specific capacity and long cycle life under high voltage ranges through proper structure design and coatings.

❖ Nanjing National Laboratory of Solid State Microstructures | Research Assistant

Advisor: **Hai-Hu Wen** (Professor, APS Fellow)

Project I: Discovery of a New Type of Superconductor LiOHFeS Aug 2016 – Nov 2016

- Successfully synthesized superconducting LiOHFeS crystals with large sizes and high quality via the hydrothermal ion-exchange method;
- Determined the critical temperature ($T_c \sim 2.8\text{K}$) of this new type II superconductor by magnetic and transportation measurements;
- Demonstrated the most likely source of superconductivity, which is the phase with a shrunk c-axis lattice constant;
- Confirmed the electric neutrality and less electron doping in the FeS planes of the system, which differs from its high T_c sister ($\text{Li}_{1-x}\text{Fe}_x\text{OHFeSe}$) system, by analyzing the energy dispersion spectrum.

Project II: Intercalation Study of Unconventional Superconductors Nov 2016 – Mar 2017

- Realized for the first time the large-scale and high-quality FeSe single crystal by utilizing a high-efficiency and low-cost hydrothermal method;
- Contributed to determination of the main influence factor of synthesizing superconducting FeSe and found the optimal ratio of the precursor;
- Found the parent compound with tetragonal stratified structures similar to the FeSe system and tried to induce the superconductivity in these systems by intercalation and doping;
- Synthesized alkali metal intercalated Bi₂Se₃ and Bi₂Te₃ system, which has promising potential to be a superconductor with novel topological properties.

Project III: Study on New Organic Superconductor Mar 2017 – Jul 2017

- Successfully synthesized potassium doped p-terphenyl and p-quaterphenyl by utilizing high-pressure synthesis and solid-state reaction methods;
- Found evidence for the superconductivity-like transition in potassium doped p-terphenyl at around 125K reported by a previous paper, challenging their conclusions;
- Analyzed the temperature dependence as well as the magnetic field dependence of magnetic susceptibilities and found a possible explanation for the invariance of the transition point;
- Discovered a series of novel alkali metal doped organic superconducting materials, including potassium doped 1, 3, 5-Triphenylbenzene, Triphenylphosphine etc., and analyzed their magnetic properties.

PUBLICATIONS

- Hai Lin, **Ruizhe Kang**, Lu Kong, Xiyu Zhu and Hai-Hu Wen. “Superconductivity in LiOHFeS single crystals with a shrunk c-axis lattice constant”, Sci. China-Phys. Mech. Astron. 60, 027411 (2017).
- Wenhao Liu, Hai Lin, **Ruizhe Kang**, Xiyu Zhu, Yue Zhang, Shuxin Zheng, and Hai-Hu Wen. “Magnetization of potassium doped p-terphenyl and p-quaterphenyl by high pressure synthesis”, Phys. Rev. B 96, 224501 (2017)

HONORS AND AWARDS

Baogang Scholarship (5/10,000+)	2017
Outstanding Student Leaders of Jiangsu Province, awardee (20/10,000+)	2017
Samsung Scholarship (2/200)	2016
National Scholarship for Physics Top-notch Talent (Top 5% in School of Physics, NJU)	2016
Nanjing University Outstanding Student Leaders, awardee (1/200)	2016
Third-Class People’s Scholarship (35/200)	2015&2016
Liao’s Scholarship (2/200)	2015

SKILLS

Computing & Software: MATLAB, OriginPro, Python, COMSOL, Materials Studio, PowderX

Material Characterization: X-Ray Diffraction (XRD), Superconducting Quantum Interference Device (SQUID), Physical Property Measurement System (PPMS), Battery Testing Systems (including: LAND, ARBIN, Solartron electrochemical workstation etc.)

Material Synthesis: hydrothermal synthesis, solid-state reaction method, Chemical Vapor Deposition (CVD), ball mill coating, battery assembly, 500+ hours experience in the glovebox