

Curriculum Vitae

Name: Dong Li

Birth date: 27.12.1996

Email: lidong@iphy.ac.cn

Department: National Lab for Superconductivity, Institute of Physics, CAS.

Address: No.8th, South third street, Zhong-Guan-Cun Haidian district Beijing 100190, China



Education:

Ph.D. in Physics, Institute of Physics, CAS, Beijing, China.

09.2017 - Today

Thesis: Preparation and Physical Properties of (Li,Fe)OHFeSe Films

Advisor: Xiaoli Dong

B.E. in Material Physics, USTB, Beijing, China.

09.2013 - 06.2017

Research interests:

My research focus on the (Li,Fe)OHFeSe superconductors [1-8], an ideal platform to study the superconducting mechanisms and potential applications for the heavily electron-doped FeSe system. Our group have developed the hydrothermal methods to synthesize the single crystals [9] and films [10] of (Li,Fe)OHFeSe, offering the flexibly synthetic routes to this community. These pioneering synthesis methods have remarkably accelerated the study on the FeSe-based superconductors grown hydrothermally [11]. Based on these high crystalline quality samples, our collaborators have found the second superconducting dome under high pressure [12] and the robust Majorana zero mode in the vortex core of (Li,Fe)OHFeSe superconductors [13]. My past work on the (Li,Fe)OHFeSe superconductors during the doctoral degree including the two aspects as followed:

For the mechanism of superconductivity: 1) To unravel the superconducting pairing symmetry of the optimal sample ($T_c \sim 42$ K), we have found the evidence to support the S_{\pm} pairing symmetry from the electronic Raman study [5]. But the STM results support the plain S wave pairing on the very same sample [4] and this discrepancy needs furthermore study to clarify. 2) In order to unravel the origin of high- T_c superconductivity for the heavily electron-doped FeSe system, we have performed the ARPES and STM measurements on a series of (Li,Fe)OHFeSe samples from the non-superconducting one to the optimal one (the relevant work is underway).

Towards the potential application: 1) We have found the high-field (33 T) critical current density (J_c) record [7] in the Mn-doped (Li,Fe)OHFeSe films [3] among all the iron-based superconductors. 2) We have found a disorder-sensitive emergent vortex phase in the high- T_c superconductor (Li,Fe)OHFeSe [1], whose property deserves further investigation. 3) Moreover, the robust Majorana zero mode was found in the vortex core of (Li,Fe)OHFeSe superconductors [13], and the following work has further demonstrated its topological origins [4, 8].

Selected publications and preprints on the (Li,Fe)OHFeSe system (12.31.2021 updated):

- [1] **D. Li**, P. Shen, J. Tian, G. He, Z. Wang, C. Xi, L. Pi, J. Yuan, K. jin, L. Yu, F. Zhou, X. Dong, Z. Zhao, A disorder-sensitive emergent vortex phase identified in high-T_c superconductor (Li,Fe)OHFeSe, *Supercond. Sci. Technol.*, Submitted, (2021).
- [2] Q. Xiao, W. Zhang, T.C. Asmara, **D. Li**, Q. Li, S. Zhang, Y. Tseng, X. Dong, Y. Wang, C.-C. Chen, T. Schmitt, Y. Peng, Dispersionless orbital excitations in (Li,Fe)OHFeSe superconductors, arXiv: 2110.05361, (2021).
- [3] **D. Li**, P. Shen, S. Ma, Z. Wei, J. Yuan, K. jin, L. Yu, F. Zhou, X. Dong, Z. Zhao, Doping effects of transition metals on the superconductivity of (Li,Fe)OHFeSe films, *Chin. Phys. B*, 30 (2021) 017402.
- [4] T. Zhang, W. Bao, C. Chen, **D. Li**, Z. Lu, Y. Hu, W. Yang, D. Zhao, Y. Yan, X. Dong, Q.-H. Wang, T. Zhang, D. Feng, Observation of Distinct Spatial Distributions of the Zero and Nonzero Energy Vortex Modes in (Li_{0.84}Fe_{0.16})OHFeSe, *Phys. Rev. Lett.*, 126 (2021) 127001.
- [5] G. He, **D. Li**, D. Jost, A. Baum, P.P. Shen, X.L. Dong, Z.X. Zhao, R. Hackl, Raman Study of Cooper Pairing Instabilities in (Li_{1-x}Fe_x)OHFeSe, *Phys. Rev. Lett.*, 125 (2020) 217002.
- [6] J. Hänisch, Y. Huang, **D. Li**, J. Yuan, K. Jin, X. Dong, E. Talantsev, B. Holzapfel, Z. Zhao, Anisotropy of flux pinning properties in superconducting (Li,Fe)OHFeSe thin films, *Supercond. Sci. Technol.*, 33 (2020) 114009.
- [7] **D. Li**, J. Yuan, P. Shen, C. Xi, J. Tian, S. Ni, J. Zhang, Z. Wei, W. Hu, Z. Li, L. Yu, J. Miao, F. Zhou, L. Pi, K. Jin, X. Dong, Z. Zhao, Giant enhancement of critical current density at high field in superconducting (Li,Fe)OHFeSe films by Mn doping, *Supercond. Sci. Technol.*, 32 (2019) 12LT01.
- [8] C. Chen, Q. Liu, T.Z. Zhang, **D. Li**, P.P. Shen, X.L. Dong, Z.-X. Zhao, T. Zhang, D.L. Feng, Quantized Conductance of Majorana Zero Mode in the Vortex of the Topological Superconductor (Li_{0.84}Fe_{0.16})OHFeSe, *Chin. Phys. Lett.*, 36 (2019) 057403.
- [9] X. Dong, K. Jin, D. Yuan, H. Zhou, J. Yuan, Y. Huang, W. Hua, J. Sun, P. Zheng, W. Hu, Y. Mao, M. Ma, G. Zhang, F. Zhou, Z. Zhao, (Li_{0.84}Fe_{0.16})OHFe_{0.98}Se superconductor: Ion-exchange synthesis of large single-crystal and highly two-dimensional electron properties, *Phys. Rev. B*, 92 (2015) 064515.
- [10] Y. Huang, Z. Feng, S. Ni, J. Li, W. Hu, S. Liu, Y. Mao, H. Zhou, F. Zhou, K. Jin, H. Wang, J. Yuan, X. Dong, Z. Zhao, Superconducting (Li,Fe)OHFeSe Film of High Quality and High Critical Parameters, *Chin. Phys. Lett.*, 34 (2017) 077404.
- [11] X. Dong, F. Zhou, Z. Zhao, Electronic and Superconducting Properties of Some FeSe-Based Single Crystals and Films Grown Hydrothermally, *Front. Phys.*, 8 (2020) 586182.
- [12] J.P. Sun, P. Shahi, H.X. Zhou, Y.L. Huang, K.Y. Chen, B.S. Wang, S.L. Ni, N.N. Li, K. Zhang, W.G. Yang, Y. Uwatoko, G. Xing, J. Sun, D.J. Singh, K. Jin, F. Zhou, G.M. Zhang, X.L. Dong, Z.X. Zhao, J.G. Cheng, Reemergence of high-T_c superconductivity in the (Li_{1-x}Fe_x)OHFe_{1-y}Se under high pressure, *Nat. Commun.*, 9 (2018) 380.
- [13] Q. Liu, C. Chen, T. Zhang, R. Peng, Y.-J. Yan, C.-H.-P. Wen, X. Lou, Y.-L. Huang, J.-P. Tian, X.-L. Dong, G.-W. Wang, W.-C. Bao, Q.-H. Wang, Z.-P. Yin, Z.-X. Zhao, D.-L. Feng, Robust and Clean Majorana Zero Mode in the Vortex Core of High-Temperature Superconductor (Li_{0.84}Fe_{0.16})OHFeSe, *Phys. Rev. X*, 8 (2018) 041056.