

Honglie Ning

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EDUCATION

California Institute of Technology

Ph.D. in Physics

Sep. 2016 -
Jul . 2022 (expected)

Pasadena, CA
US

Peking University

B.S. in Physics (with Honors)

Sep. 2012 -
Jul . 2016

Beijing, BJ
China

RESEARCH EXPERIENCE

Institute for Quantum Information and Matter California Institute of Technology

Sep. 2016 -
Jul . 2022 (expected)

Pasadena, CA
USA

Advisor - David Hsieh

Ultrafast manipulation of order parameters in strongly correlated materials:

Harnessed time-resolved optical spectroscopy and nonlinear polarimetry to investigate the ultrafast reversal of excitonic order in Ta₂NiSe₅, the transient switch of spin-nematic order in Ca₂RuO₄, and the nonthermal quenching of antiferromagnetic order in Sr₂IrO₄.

Nonlinear carrier excitation and band modulation in strongly correlated materials:

Utilized intense midinfrared pump to achieve multiphoton-to-quantum tunneling Keldysh crossover and observed coherent bandwidth renormalization and nonlinear doublon-holon pair production with time-resolved optical spectroscopy in the Mott insulator Ca₂RuO₄.

Nonequilibrium generation and manipulation of collective excitations:

Leveraged time-resolved THz spectroscopy to uncover a magnetism-mediated Hubbard exciton in the relativistic Mott insulator Sr₂IrO₄, and used time-resolved coherent phonon spectroscopy to unravel the ultrafast enhancement of ferromagnetic spin exchange in CrSiTe₃.

Characterization and dynamics of the structure of topological materials:

Employed static and time-resolved nonlinear optical polarimetry to interrogate the lattice structure and the associated dynamics in topological material candidates Te, PrAlSi, and Co₂MnGa.

Construction of time- and angle-resolved photoemission spectroscopy and time-resolved THz reflection and emission spectroscopy

Development of microscopic and phenomenological theories to understand the dynamical evolution of order parameters and selective amplification of collective excitations in strongly correlated systems.

Department of Physics University of Michigan

Jul . 2015 -
Sep. 2015

Ann Arbor, MI
USA

Advisor - Lu Li

Thermal transport measurement of GaSb/InAs quantum well

**SLAC National Accelerator Laboratory and
Stanford University**

Aug. 2015 -
Dec. 2015

Menlo Park, ML
USA

**International Center for Quantum Materials,
Peking University**

Aug. 2015 -
Dec. 2015

Beijing, BJ
China

Advisor - Yan Zhang

Angle-resolved photoemission spectroscopy measurements of single-crystal FeSe

**International Center for Quantum Materials,
Peking University**

Jun. 2014 -
Mar. 2016

Beijing, BJ
China

Advisor - Jian Wang

Synthesis and magnetotransport measurements of WS₂ and Dirac/Weyl semimetal candidates

HONORS AND AWARDS

Tombrello Scholar,
France A Cordova
Graduate Student Fund

2021

California
Institute of
Technology

National Scholarship,
WeiMingXueZi Fellowship

2015

Peking
University

Samsung Scholarship

2014

Peking
University

Tung OOCL Scholarship

2013

Peking
University

Merit Student Award

2013-
2015

Peking
University

PUBLICATIONS

Peer-reviewed and preprint papers (* denotes equal contribution):

H. Ning, O. Mehio, M. Buchhold, T. Kurumaji, G. Refael, J. G. Checkelsky, D. Hsieh, Signatures of ultrafast reversal of excitonic order in Ta₂NiSe₅, *Phys. Rev. Lett.* 125, 267602 (2020).

A. Ron, S. Chaudhary, G. Zhang, **H. Ning**, E. Zoghlin, S. D. Wilson, R. D. Averitt, G. Refael, D. Hsieh, Ultrafast enhancement of ferromagnetic spin exchange induced by ligand-to-metal charge transfer, *Phys. Rev. Lett.* 125, 197203 (2020).

Y. Zhang*, **H. Ning***, Y. Li, Y. Liu, and J. Wang, Negative to positive crossover of the magnetoresistance in layered WS₂, *Appl. Phys. Lett.* 125, 153114 (2016).

Z. Ye, C. Zhang, **H. Ning**, W. Li, L. Chen, T. Jia, M. Hashimoto, D. Lu, Z.-X. Shen, Y. Zhang, Simultaneous emergence of superconductivity, inter-pocket scattering and nematic fluctuation in potassium-coated FeSe superconductor, arXiv: 1512.02526 (2015).

Manuscripts submitted or in preparation (* denotes equal contribution):

X. Li*, **H. Ning***, O. Mehio*, B. Hu, M. C. Lee, K. W. Kim, T. W. Noh, G. Cao, D. Hsieh, Keldysh space control of charge dynamics in a strongly driven Mott insulator, submitted to *Nat. Photonics*.

H. Ning*, O. Mehio*, C. Lian*, X. Li, E. Zoghlin, P. Zhou, B. Cheng, S. D. Wilson, B. M. Wong, D. Hsieh, A light-induced Weyl semiconductor-to-metal transition mediated by Peierls instability, to be submitted to *Nat. Mater.*

H. Ning*, O. Mehio*, X. Li*, M. Buchhold, B. Hu, G. Cao, D. Hsieh, Evidence for ultrafast switch of the spin-nematic order in Ca_2RuO_4 , to be submitted to *Nat. Phys.*

O. Mehio*, X. Li*, **H. Ning***, Z. Lenarčič, M. Buchhold, Z. Porter, N. J. Laurita, S. D. Wilson, D. Hsieh, Observation of Hubbard exciton in an antiferromagnetic Mott insulator, to be submitted to *Nature*.

**PRESENTATIONS
AND POSTERS**

H. Ning, O. Mehio, M. Buchhold, T. Kurumaji, G. Refael, J. G. Checkelsky, D. Hsieh, Signatures of ultrafast reversal of excitonic order in Ta_2NiSe_5 , APS March Meeting (2021).

H. Ning, O. Mehio, M. Buchhold, T. Kurumaji, J. Checkelsky, G. Refael, D. Hsieh, Dynamics of an order parameter coupled phonon in an excitonic insulator, APS March Meeting. (2020)

H. Ning, O. Mehio, N. J. Laurita, E. Zoghlin, S. D. Wilson, D. Hsieh, Time-resolved second harmonic generation polarimetry study of elemental tellurium, APS March Meeting. (2019)

Y. Zhang*, **H. Ning***, Y. Li, Y. Liu, and J. Wang, Negative to positive crossover of magnetoresistance in WS_2 nanoflakes with ohmic contact, APS March Meeting. (2016)

H. Ning, Lu Li, and Jian Wang, Electrical and thermal transport measurements of low dimensional materials, National Conference for Excellent Innovative Talents in Basic Science. (2015).

**TEACHING
ASSISTENTSHIP
AND
MENTORSHIP**

Teaching assistant of Physics of Measurement (Ph118, Graduate level)	2021	California Institute of Technology
Thesis mentor for 3 undergraduates; Summer research mentor for 1 undergraduate and 4 high school students	2017- 2021	California Institute of Technology