DONGJIN OH

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EDUCATION

Seoul National University, Republic of Korea *March 2016 - February 2022*
Ph.D in Physics
Adviser: Prof. Changyoung Kim

Incheon National University, Republic of Korea *March 2010 - February 2016*
B.S. in Physics

CAREER

Postdoctoral Associate *September 2022 - Present*
Department of Physics, Massachusetts Institute of Technology (MIT)
Adviser: Prof. Riccardo Comin

Postdoctoral researcher *March 2022 - August 2022*
Center for Correlated Electron Systems, Institute for Basic Science (IBS-CCES)
Department of Physics and Astronomy, Seoul National University
Adviser: Prof. Changyoung Kim

RESEARCH EXPERIENCE

Raman spectroscopy & Superconductivity *2016 - 2022*
Raman spectroscopy studies on copper oxide superconductors
- B_{1g} phonon anomaly driven by Fermi surface instability at intermediate temperature in $YBa_2Cu_3O_{7-\delta}$

Constructed ultra-low frequency micro-Raman spectroscopy setup
- Designed and built the micro-Raman spectroscopy setup
- Installed the Bragg grating notch filters to measure the ultra-low frequency Raman signal

Constructed macro-Raman spectroscopy setup
- Designed and built the macro-Raman spectroscopy setup with closed-cycle cryostat

Molecular Beam Epitaxy (MBE) & Correlated and Topological materials *2018 - 2022*
ARPES & transport studies on magnetic topological insulator $MnBi_2Te_4$ thin films
- $MnBi_2Te_4$ thin films growth using molecular beam epitaxy
- Measured electronic structure of $MnBi_2Te_4$ thin films
- Gate-controlled anomalous Hall effect and magnetoresistance of $MnBi_2Te_4$ thin films

Growth of various materials in atomically thin limit
- Single-layer FeSe / $SrTiO_3$, FeTe, $FeTe_{1-x}Se_x$, Bi_2Te_3, MnTe, etc.

Surface treatment of various substrates
- $SrTiO_3$ (100), $SrTiO_3$ (111), 7×7 reconstructed Si (111) surface, bilayer graphene grown on the SiC (0001), etc.

Constructed Molecular Beam Epitaxy setup
- Led the construction of MBE setup and MBE & ARPES *in-situ* cluster system
- Designed and built the annealing stage capable of electron beam heating and direct current heating for substrate
- Development of integrated MBE monitoring program with LabVIEW
- Development of multi region of interest (ROI) RHEED analysis program with LabVIEW

van der Waals heterostructures *2018 - 2019*
Spectroscopic studies on van der Waals heterostructures
- Studied electronic structure of van der Waals heterostructures using micro-ARPES at synchrotron facility
- Micro-Raman and photoluminescence spectroscopy studies on van der Waals heterostructures
- Constructed motorized van der Waals transfer system in the glove box

***in-situ* ARPES cluster system** *2016 - 2017*

Constructed home-lab in-situ ARPES cluster system

- Co-lead the construction of *in-situ* ARPES cluster system included high-resolution ARPES, spin-ARPES, x-ray photoelectron spectroscopy (XPS), preparation chamber, pulsed laser deposition (PLD) system and MBE system

SKILLS

Spectroscopy

- Micro- & Macro-Raman and photoluminescence spectroscopy
- Angle-resolved photoemission spectroscopy in home-lab and synchrotron facilities

Sample fabrication & Characterization

- Epitaxial growth of thin films using molecular beam epitaxy
- Construction of van der Waals heterostructures using dry transfer methods
- *in-situ* characterization of the sample with reflection high-energy electron diffraction (RHEED) and low energy electron diffraction (LEED)
- Thin film x-ray diffraction (XRD), atomic force microscopy (AFM), physical properties measurement system (PPMS), magnetic properties measurement system (MPMS)
- Device fabrication with metal deposition through metal mask and indium cold welding

Ultra high vacuum

- Construction and maintenance of ultra-high vacuum (UHV) system

Cryogenics

- Liquified He and N_2

Programming

- Igor, Origin, Labview, Vesta, Adobe Illustrator, Solidworks

PUBLICATIONS

6. Amplitude excitation and giant spin-lattice fluctuations in a pyrochlore ruthenate single crystal
Dirk Wulferding, Junkyeong Kim, Mi Kyung Kim, Yang Yang, Jae Hyuk Lee, Dongjoon Song, **Dongjin Oh**, Heung-Sik Kim, Li Ern Chern, Yong Baek Kim, Minji Noh, Hyunyong Choi, Sungkyun Choi, Natalia B. Perkins, Changyoung Kim, Seung Ryong Park
arXiv:2204.12124 (2022)

5. Kondo interaction in FeTe and its potential role in the magnetic order
Younsik Kim, Minsoo Kim, Min-Seok Kim, Cheng-Maw Cheng, Joonyoung Choi, Saegyeol Jung, Donghui Lu, Jong Hyuk Kim, Soohyun Cho, Dongjoon Song, **Dongjin Oh**, Li Yu, Young Jai Choi, Hyeong-Do Kim, Jung Hoon Han, Younjung Jo, Jungpil Seo, Soonsang Huh, Changyoung Kim
arXiv:2203.06432 (2022)

4. B_{1g} phonon anomaly driven by Fermi surface instability at intermediate temperature in $YBa_2Cu_3O_{7-\delta}$
Dongjin Oh, Dongjoon Song, Younsik Kim, Shigeki Miyasaka, Setsuko Tajima, Jin Mo Bok, Yunkyu Bang, Seung Ryong Park, Changyoung Kim
Physical Review Letters **127**, 277011 (2021)

3. Deep learning-based statistical noise reduction for multidimensional spectral data
Younsik Kim, **Dongjin Oh**, Soonsang Huh, Dongjoon Song, Sunbeom Jeong, Junyoung Kwon, Minsoo Kim, Donghan Kim, Hanyoung Ryu, Jongkeun Jung, Wonshik Kyung, Byungmin Sohn, Suyoung Lee, Jounghoon Hyun, Yeonghoon Lee, Yeongkwan Kim, Changyoung Kim
Review of Scientific Instruments **92**, 073901 (2021)

2. Sign-tunable anomalous Hall effect induced by symmetry protected nodal structures in ferromagnetic perovskite oxide thin films
Byungmin Sohn, Eunwoo Lee, Se Young Park, Wonshik Kyung, Jinwoong Hwang, Jonathan D. Delinger, Minsoo Kim, Donghan Kim, Bongju Kim, Hanyoung Ryu, Soonsang Huh, Ji Seop Oh, Jong Keun Jung, **Dongjin Oh**, Younsik Kim, Moonsup Han, Tae Won Noh, Bohm-Jung Yang, Changyoung Kim
Nature Materials **20**, 1643-1649 (2021)

1. Line-shape analysis of the Raman spectrum from $\mathbf{B_{1g}}$ bond buckling phonon in $\mathbf{Bi_2Sr_2CaCu_2O_{8+x}}$
Ju-Yeong Jeong, **Dongjin Oh**, Dongjoon Song, Hiroshi Eisaki, Changyoung Kim, Seung Ryong Park
Progress in Superconductivity and Cryogenics **21**, 9-12 (2019)

AWARDS

2021 Winter semester BK21 Scholarship

Excellence Presentation Award
2022 Summer Conference of Korea Society of Superconductivity and Cryogenics, February 2022

Excellence Presentation Award
2021 Summer Conference of Korea Society of Superconductivity and Cryogenics, August 2021

PRESENTATIONS

8. $\mathbf{B_{1g}}$ phonon anomaly driven by Fermi surface instability at intermediate temperature in $\mathbf{YBa_2Cu_3O_{7-\delta}}$
2021 Summer Conference of Korea Society of Superconductivity and Cryogenics, August 2021, Rep. of Korea

7. $\mathbf{B_{1g}}$ phonon anomaly above superconducting transition temperature in $\mathbf{YBa_2Cu_3O_{7-\delta}}$
2021 Winter Conference of Korea Society of Superconductivity and Cryogenics, February 2021, Rep. of Korea

6. $\mathbf{B_{1g}}$ phonon anomaly in pseudogap phase of $\mathbf{YBa_2Cu_3O_{7-\delta}}$ revealed by Raman spectroscopy
Korean Physical Society Fall Meeting, September 2020, Rep. of Korea

5. Emergence of $\mathbf{B_{1g}}$ phonon anomaly above superconducting transition temperature in $\mathbf{YBa_2Cu_3O_{7-\delta}}$ measured by Raman spectroscopy
2020 Summer Conference of Korea Institute of Applied Superconductivity and Cryogenics, June 2020, Rep. of Korea

4. Emergence of $\mathbf{B_{1g}}$ phonon anomaly between superconducting and pseudogap transition temperature in optimally doped $\mathbf{YBa_2Cu_3O_{7-\delta}}$ measured by Raman spectroscopy
Korean Physical Society Fall Meeting, October 2019, Rep. of Korea

3. Ultra-low frequency micro-Raman spectroscopy system with piezoelectric actuator for strain tuning *December 2017, Rep. of Korea*
Center for Correlated Electron Systems (CCES) workshop, June 2018, Rep. of Korea

2. In-plane anisotropic properties of excitons in $\mathbf{ReS_2}$ and $\mathbf{ReSe_2}$
International Conference on Advanced Materials and Devices (ICAMD), December 2017, Rep. of Korea

1. Photoluminescence studies on bulk $\mathbf{ReS_2}$ and $\mathbf{ReSe_2}$
Center for Correlated Electron Systems (CCES) workshop, June 2017, Rep. of Korea

INVITED TALKS

2. Spectroscopic studies on electronic structure of quantum materials
2022 Intelligent Sensor Convergence Research Center (ISCRC) Coloquium, August 2022, Rep. of Korea

1. $\mathbf{B_{1g}}$ phonon anomaly driven by Fermi surface instability at intermediate temperature in $\mathbf{YBa_2Cu_3O_{7-\delta}}$
International Workshop on Recent Progress in Superconductivity 2022 (IWRS 2022), August 2022, Rep. of Korea

EXTRACURRICULAR

Military service *June 2011 - April 2013*
Military service in Republic of Korea Army