

Yusuke Iguchi

PhD

Postdoctoral Research Fellow, Stanford University

JSPS Overseas Research Fellow

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Education

BS, Department of Physics, Tokyo University of Science, Tokyo (2013)[Mitsuda group]

MS, Department of Basic Science, University of Tokyo, Tokyo (2015)[Onose group]

PhD, Department of Basic Science, University of Tokyo, Tokyo (2018)[Onose group]

Employment history/work experience

April 2016-March 2018, Research Fellow (DC2) of Japan Society for Promotion of Science (JSPS)

April 2018-current, Overseas Research Fellow of JSPS

April 2018-current, Postdoctoral Research Fellow, Department of Applied Physics, Stanford University, USA

Honors and Awards

Selected for the Dean's list (2015)

JPSJ Papers of Editors' choice (2017)

Area of Specialty

“Uniaxial-Pressure Effects on Spin-Driven Lattice Distortions in Geometrically Frustrated Magnets $\text{CuFe}_{1-x}\text{Ga}_x\text{O}_2$ ($x=0, 0.035$)”

BS, Tokyo University of Science (2012):

We revealed that the lattice largely responds to a pressure near the phase transition point in CuFeO_2 , which has a strong spin-lattice correlation, by the measurement of Synchrotron radiation in uniaxial press.[1]

“Non-reciprocity of magnon excitations in non-centrosymmetric magnets”

PhD, University of Tokyo (2013-2018):

I am a first member of Onose Laboratory. We launched the 20 GHz microwave measurement system and implemented the creation of single crystal, the design of microwave antenna, and the micro-fabrication. We first observed the nonreciprocal microwave response via the asymmetric magnon-band in chiral system, which is denoted as the Rashba effect in magnon system.[2] In addition, in the microwave measurement system, we observed the nonreciprocal propagation of surface acoustic wave (SAW) via the phonon-magnon coupling[4], and we electrically and magnetically controlled the nonreciprocal propagation of microwave in multiferroics.[5,6] In addition, we also designed the 40 GHz microwave measurement system. We succeeded in observing the nonreciprocal microwave propagation in antiferromagnetic multiferroics and quantitatively evaluating the nonreciprocity.[7]

“Study of local superconducting states in unconventional superconductors by using scanning SQUID Microscopy”

Postdoc, Stanford University(2018-current):

I am working as a postdoctoral scholar at Stanford university in Moler group from 2018. I am supported by JSPS Overseas research fellowship. We newly launched the cryogenic dilution unit (BLUEFORS) and introduced the scanning SQUID microscope. We scanned the chiral d-wave superconductor candidate URu₂Si₂ and observed the anisotropic vortex dynamics related to the electron nematic order (manuscript in preparation). Ahead of it, we also observed the similar anisotropic vortex dynamics in the nematic superconductor FeSe at another cryogenic 4K cryostat (BLUEFORS).[8] This anisotropic dynamics depends on the twin boundary of the nematic order and can be explained by our simulation with use of the toy model of the quadratic pinning potential.

Recently we are trying to measure the spontaneous chiral edge current (which is specific to chiral superconductors) and the linear response of the superconducting critical temperature against uniaxial stress (which is unique to superconductors with multiple superconducting phases such as $(k_x \pm ik_y)$) in the chiral d-wave candidate URu₂Si₂ and the chiral p-wave candidate Sr₂RuO₄. I am also interested in the local magnetic resonances detected by scanning SQUID Microscopy. We are trying to pioneer the local magnetic measurement by using scanning SQUID microscopy and to reveal the unique properties of unconventional superconductors and magnetic materials.

Experimental skills

Measurement

- Synchrotron X-Ray diffraction (2012, Mitsuda group(TUS) at KEK Photon Factory)
- Mechanical uniaxial stress (2012, Mitsuda group(TUS))
- Low temperature Microwave broadband measurement in magnetic field (2013-2018, Onose group(UT))
- Design of microwave circuit (2013-2018, Onose group(UT))
- Micro Fabrication of Microwave circuit by using Photo- and Electron Beam-lithography (2013-2018, Onose group(UT))
- Scanning SQUID microscopy measurement (2018-current, Moler group(SU))
- Ultra low temperature measurement (Cryogenic dilution cryostat, Liquid He4 cryostat)
- Micro uniaxial stress measurement by Piezo (2019-current, Hicks group(Max Planck))

Sample growth

- Polycrystal growth (Electron beam-, Spattering-, Resistance heating-evaporations)
- Single crystal growth (Floating zone-, Flux-methods)

Others

- Programing (Perl, Python)
- Equipment Remote Control (Lab view, MATLAB, Python)
- Radioactive material treatment (URu₂Si₂, 2018-current, Moler group(SU))

List of Publication

- [8] Imaging anisotropic vortex dynamics in FeSe
Irene P. Zhang, Johanna C. Palmstrom, Hilary Noad, Logan Bishop-Van Horn,
Yusuke Iguchi, Zheng Cui, John R. Kirtley, Ian R. Fisher, Kathryn A. Moler
Preprint: [arXiv:1903.11542](https://arxiv.org/abs/1903.11542)
- [7] Microwave non-reciprocity of magnon excitations in a non-centrosymmetric
antiferromagnet Ba₂MnGe₂O₇
Y. Iguchi, Y. Nii, M. Kawano, H. Murakawa, N. Hanasaki, and Y. Onose
Phys. Rev. B **98**, [064416](https://doi.org/10.1103/PhysRevB.98.064416) (2018). ([arXiv](https://arxiv.org/abs/1805.08881))

- [6] Magnetolectrical control of nonreciprocal microwave response in a multiferroic helimagnet
Y. Iguchi, Y. Nii, and Y. Onose
 Nature Communications **8**, [15252](#) (2017), ([arXiv](#))
- [5] Microwave Magneto-Chiral Effect in a Noncentro-symmetric Magnet CuB_2O_4
 Y.Nii, R. Sasaki, Y. Iguchi, and Y. Onose
 J. Phys. Soc. Jpn. **86**, [024707](#) (2017).[Editors' choice]([arXiv](#))
 Pick up:[JPSJ News and Comments](#)
- [4] Nonreciprocal propagation of surface acoustic wave in Ni/LiNbO_3
 R. Sasaki, Y. Nii, Y. Iguchi, and Y. Onose
 Phys. Rev. B **95**, [020407\(R\)](#) (2017). ([arXiv](#))
- [3] Terahertz Radiation by Subpicosecond Magnetization Modulation in the Ferrimagnet LiFe_5O_8
 Y. Kinoshita, N. Kida, M. Sotome, T. Miyamoto, Y. Iguchi, Y. Onose, and H. Okamoto
 ACS photonics **3**, [1170](#) (2016).
- [2] Nonreciprocal magnon propagation in a noncentrosymmetric ferromagnet LiFe_5O_8
Y. Iguchi, S. Uemura, K. Ueno, and Y. Onose
 Phys. Rev. B **92**, [184419](#) (2015). ([arXiv](#))
- [1] Uniaxial-Pressure Effects on Spin-Driven Lattice Distortions in Geometrically Frustrated Magnets $\text{CuFe}_{1-x}\text{Ga}_x\text{O}_2$ ($x=0, 0.035$)
 T. Nakajima, Y. Iguchi, H. Tamatsukuri, S. Mitsuda, Y. Yamasaki, H. Nakao, and N. Terada
 J. Phys. Soc. Jpn. **82**, [114711](#) (2013).

International Presentation

- [9] "Local rotational symmetry breaking of superconducting phase in URu_2Si_2 "(Oral, Poster)
 Y. Iguchi
 CIFAR QM(Canadian Institute of Foundation for Advanced Research Quantum Materials) Program Meeting 2019 (Vancouver) [Poster session](#),
 And CIFAR QM Summer school 2019(University of British Columbia), [Oral & Poster session](#)
- [8] "Study of chiral d-wave superconductor candidate URu_2Si_2 by using scanning SQUID microscopy"(Oral)
Y. Iguchi, I.P. Zhang, E.D. Bauer, F. Ronning, J.R. Kirtley, and K.A. Moler
 American Physical Society March Meeting 2019(Boston), Session [X08.00010](#)

- [7] "Anisotropic Vortex Pinning in Single Crystal FeSe"(Oral)
I. Zhang, L. B.-V. Horn, J. Palmstrom, J. R. Kirtley, Y. Iguchi, I. R. Fisher, K. A. Moler
American Physical Society March Meeting 2019(Boston), Session [X10.00010](#)
- [6] "Non-reciprocal microwave response of antiferromagnetic magnons in a multiferroic Ba₂MnGe₂O₇"(Oral)
Y. Iguchi, Y. Nii, H. Murakawa, N. Hanasaki, and Y. Onose
American Physical Society March Meeting 2018(Los Angeles), Session [H23.00009](#)
- [5] "Microwave response of antiferromagnetic magnons in a multiferroic Ba₂MnGe₂O₇"
(Poster)
Y. Iguchi, Y. Nii, and Y. Onose
Junjiro Kanamori Memorial International Symposium 2017(Tokyo), Poster : [P56](#)
- [4] "Magnetolectrical control of nonreciprocal microwave response in a multiferroic helimagnet"(Oral)
Y. Iguchi, Y. Nii, and Y. Onose
American Physical Society March Meeting 2017(New Orleans), Session [F50.00008](#)
- [3] "Nonreciprocal propagation of surface acoustic waves in Ni/LiNbO₃"(Oral)
R. Sasaki, Y. Nii, Y. Iguchi, and Y. Onose
American Physical Society March Meeting 2017(New Orleans), Session [A47.00013](#)
- [2] "Magnetolectrical control of nonreciprocal microwave response in a multiferroic helimagnet"(Poster)
Y. Iguchi
CEMS-QPEC Symposium on Emergent Quantum Materials 2017(Tokyo), Poster session : [P29](#)
- [1] "Nonreciprocal magnon propagation in a noncentrosymmetric ferromagnet LiFe₅O₈"(Oral)
Y. Iguchi, S. Uemura, K. Ueno, and Y. Onose
American Physical Society March Meeting 2016(Baltimore), Session [B6.00002](#)

Domestic Presentation (in Japanese)

- [11] "Study of chiral d-wave superconductor candidate URu₂Si₂ by using scanning SQUID microscopy"(Oral)
Y. Iguchi, I.P. Zhang, E.D. Bauer, F. Ronning, J.R. Kirtley, and K.A. Moler
The Physical Society of Japan, 74th Annual Meeting (Kyushu Univ.), Division 8, 14aS302-8
- [10] "Microwave response to antiferromagnetic resonance in multiferroics

Ba₂MnGe₂O₇"(Oral)

Yusuke Iguchi, Yoichi Nii, and Yoshinori Onose

The Physical Society of Japan, Autumn Meeting 2017 (Iwate Univ.), Division 8,
[23aE31-8](#)

- [9] "Research of microwave nonreciprocity on a multiferroic using a superconducting circuit resonator"(Oral)

Yoshiaki Hamahara, Yoichi Nii, Yusuke Iguchi, and Yoshinori Onose

The Physical Society of Japan, Autumn Meeting 2017 (Iwate Univ.), Division 8,
[22pF21-11](#)

- [8] "Electric control of nonreciprocal microwave response in ferroelectric spiral magnet"(Oral)

Yusuke Iguchi, Yoichi Nii, and Yoshinori Onose

The Physical Society of Japan, Autumn Meeting 2016 (Kanazawa Univ.), Division 3,
[13aAA-8](#)

- [7] "Microwave response of a noncentrosymmetric magnet CuB₂O₄"(Oral)

Y. Nii, R. Sasaki, Y. Iguchi, and Y. Onose

The Physical Society of Japan, Annual (71st) Meeting (Tohoku Gakuin Univ.),
Division 3, [22aAU-2](#)

- [6] "Magnetoelastic coupling and nonreciprocity of surface acoustic wave on Ni/LiNbO₃"(Oral)

R. Sasaki, Y. Nii, Y. Iguchi, and Y. Onose

The Physical Society of Japan, Annual (71st) Meeting (Tohoku Gakuin Univ.),
Division 3, [19aAU-11](#)

- [5] "Magnetization dynamics in ferrimagnetic LiFe₅O₈ extracted from analyzing terahertz radiation by fast magnetization modulation via femtosecond laser irradiation"(Oral)

Y. Kinoshita, N. Kida, T. Miyamoto, H. Yada, Y. Iguchi, Y. Onose, and H. Okamoto

The Physical Society of Japan, Autumn Meeting 2015 (Kansai Univ.), Division
5, [16pCF-9](#)

- [4] "Nonreciprocal microwave response on large wave number magnon modes in a noncentrosymmetric ferromagnet LiFe₅O₈"(Oral)

Yusuke Iguchi, Souichiro Uemura, Kazunori Ueno, and Yoshinori Onose

The Physical Society of Japan, Annual (70th) Meeting (Waseda Univ.), Division
3, [24aAD-6](#)

- [3] "Terahertz radiation due to ultrafast modulation of magnetization in ferrimagnetic

LiFe₅O₈"(Oral)

Y. Kinoshita, N. Kida, T. Miyamoto, H. Yada, Y. Iguchi, Y. Onose, and H. Okamoto
The Physical Society of Japan, Annual (70th) Meeting (Waseda Univ.), Division
5, [23pCP-6](#)

[2] "Microwave response of noncentrosymmetric magnet LiFe₅O₈"(Oral)

Yusuke Iguchi and Yoshinori Onose

The Physical Society of Japan, Annual (69th) Meeting (Tokai Univ.), Division 3 and
8, [29pAY-6](#)

[1] "X-ray diffraction measurements on frustrated magnets CuFe_{1-x}Ga_xO₂ (x=0,0.035)
under uniaxial pressure"(Oral)

Taro Nakajima, Yusuke Iguchi, Hiromu Tamatsukuri, Setsuo Mitsuda, Yuichi
Yamasaki, Hironori Nakao, and Noriki Terada

The Physical Society of Japan, Autumn Meeting 2013 (Tokushima Univ.), Division
3, [25aKF-4](#)