

## Publication & Presentation List of Tetsuo Hanaguri (Feb. 18th, 2025)

### Refereed Articles

1. “Valley Polarization of Landau Levels in the ZrSiS Surface Band Driven by Residual Strain”, Christopher J. Butler, Masayuki Murase, Shunki Sawada, Ming-Chun Jiang, Daisuke Hashizume, Guang-Yu Guo, Ryotaro Arita, **Tetsuo Hanaguri**, and Takao Sasagawa  
Phys. Rev. X **15**, 011033 (2025). <https://doi.org/10.1103/PhysRevX.15.011033>
2. “Searching for Majorana quasiparticles at vortex cores in iron-based superconductors”, Tadashi Machida and **Tetsuo Hanaguri**  
Prog. Theor. Exp. Phys. **2024** 08C103 (2024). <https://doi.org/10.1093/ptep/ptad084>
3. “Closing of the Mott gap near step edges in NiS<sub>2</sub>”  
Yuuki Yasui, Kota Iwata, Shota Okazaki, Shigeki Miyasaka, Yoshiaki Sugimoto, **Tetsuo Hanaguri**, Hidenori Takagi, and Takao Sasagawa  
Phys. Rev. B **110**, 045139 (2024). <https://doi.org/10.1103/PhysRevB.110.045139>
4. “Behavior under magnetic field of resonance at the edge of the upper Hubbard band in 1T-TaS<sub>2</sub>”  
C. J. Butler, M. Yoshida, **T. Hanaguri**, and Y. Iwasa  
Phys. Rev. B **107**, L161107 (2023). <https://doi.org/10.1103/PhysRevB.107.L161107>
5. “Correlation-driven electronic nematicity in the Dirac semimetal BaNiS<sub>2</sub>”  
Christopher John Butler, Yuhki Kohsaka, Youichi Yamakawa, Mohammad Saeed Bahramy, Seiichiro Onari, Hiroshi Kontani, **Tetsuo Hanaguri**, and Shinichi Shamoto  
Proc. Natl. Acad. Sci. USA **119**, e2212730119 (2022). <https://www.pnas.org/doi/10.1073/pnas.2212730119>
6. “Zeeman effects on Yu-Shiba-Rusinov states”  
T. Machida, Y. Nagai, **T. Hanaguri**  
Phys. Rev. Res. **4**, 033182 (2022). <https://doi.org/10.1103/PhysRevResearch.4.033182>
7. “Superconductivity near the saddle point in the two-dimensional Rashba system Si(111)- $\sqrt{3} \times \sqrt{3}$ -(Tl,Pb)”  
T. Machida, Y. Yoshimura, T. Nakamura, Y. Kohsaka, **T. Hanaguri**, C. -R. Hsing, C. -M. Wei, Y. Hasegawa, S. Hasegawa, and A. Takayama  
Phys. Rev. B **105**, 064507 (2022). <https://doi.org/10.1103/PhysRevB.105.064507>
8. “Quasiparticle Nodal Plane in the Fulde-Ferrell-Larkin-Ovchinnikov State of FeSe”  
S. Kasahara, H. Suzuki, T. Machida, Y. Sato, Y. Ukai, H. Murayama, S. Suetsugu, Y. Kasahara, T. Shibauchi, **T. Hanaguri**, and Y. Matsuda  
Phys. Rev. Lett. **127**, 257001 (2021). <https://doi.org/10.1103/PhysRevLett.127.257001>
9. “Doublonlike Excitations and Their Phononic Coupling in a Mott Charge-Density-Wave System”  
C. J. Butler, M. Yoshida, **T. Hanaguri**, and Y. Iwasa  
Phys. Rev. X **11**, 011059 (2021). <https://doi.org/10.1103/PhysRevX.11.011059>
10. “Imaging the coupling between itinerant electrons and localised moments in the centrosymmetric skyrmion magnet GdRu<sub>2</sub>Si<sub>2</sub>”  
Yuuki Yasui, Christopher J. Butler, Nguyen Duy Khanh, Satoru Hayami, Takuya Nomoto, **Tetsuo Hanaguri**, Yukitoshi Motome, Ryotaro Arita, Taka-hisa Arima, Yoshinori Tokura, and Shinichiro Seki

- Nature Commun. **11**, 5925 (2020). <https://doi.org/10.1038/s41467-020-19751-4>
11. “*Exotic Superconducting States in FeSe-based Materials*”,  
T. Shibauchi, **T. Hanaguri**, and Y. Matsuda,  
J. Phys. Soc. Jpn. **89**, 102002 (2020). <https://doi.org/10.7566/JPSJ.89.102002>
  12. “*Mottness versus unit-cell doubling as the driver of the insulating state in 1T-TaS<sub>2</sub>*”  
C. J. Butler, M. Yoshida, **T. Hanaguri** and Y. Iwasa  
Nature Commun. **11**, 2477 (2020). <https://doi.org/10.1038/s41467-020-16132-9>
  13. “*Scalable Majorana vortex modes in iron-based superconductors*”  
Ching-Kai Chiu, T. Machida, Yingyi Huang, **T. Hanaguri**, and Fu-Chun Zhang  
Science Adv. **6**, eaay0443 (2020). <https://doi.org/10.1126/sciadv.aay0443>
  14. “*Microscopic characterization of the superconducting gap function in Sn<sub>1-x</sub>In<sub>x</sub>Te*”  
T. Nomoto, M. Kawamura, T. Koretsune, R. Arita, T. Machida, **T. Hanaguri**, M. Kriener, Y. Taguchi and  
Y. Tokura  
Phys. Rev. B **101**, 014505 (2020). <https://doi.org/10.1103/PhysRevB.101.014505>
  15. “*Zero-energy vortex bound state in the superconducting topological surface state of Fe(Se,Te)*”  
T. Machida, Y. Sun, S. Pyon, S. Takeda, Y. Kohsaka, **T. Hanaguri**, T. Sasagawa and T. Tamegai  
Nature Mater. **18**, 811–815 (2019). <https://doi.org/10.1038/s41563-019-0397-1>.
  16. “*Quantum Vortex Core and Missing Pseudogap in the Multiband BCS-BEC Crossover Superconductor FeSe*”  
**T. Hanaguri**, S. Kasahara, J. Böker, I. Eremin, T. Shibauchi, and Y. Matsuda  
Phys. Rev. Lett. **122**, 077001 (2019). <https://doi.org/10.1103/PhysRevLett.122.077001>.
  17. “*Ultrathin Bismuth Film on High-Temperature Cuprate Superconductor Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8+δ</sub> as a Candidate of a Topological Superconductor*”  
Natsumi Shimamura, Katsuaki Sugawara, Sukrit Sucharitakul, Seigo Souma, Katsuya Iwaya, Kosuke Nakayama, Chi Xuan Trang, Kunihiko Yamauchi, Tamio Oguchi, Kazutaka Kudo, Takashi Noji, Yoji Koike, Takashi Takahashi, **Tetsuo Hanaguri**, and Takafumi Sato  
ACS Nano **12**, 10977 (2018). <https://doi.org/10.1021/acsnano.8b04869>
  18. “*A scanning tunneling microscope for spectroscopic imaging below 90 mK in magnetic fields up to 17.5 T*”  
T. Machida, Y. Kohsaka, and **T. Hanaguri**  
Rev. Sci. Instrum. **89**, 093707 (2018). <https://doi.org/10.1063/1.5049619>
  19. “*Two distinct superconducting pairing states divided by the nematic end point in FeSe<sub>1-x</sub>S<sub>x</sub>*”  
**T. Hanaguri**, K. Iwaya, Y. Kohsaka, T. Machida, T. Watashige, S. Kasahara, T. Shibauchi, and Y. Matsuda  
Science Adv. **4**, eaar6419 (2018). <https://doi.org/10.1126/sciadv.aar6419>
  20. “*Full-gap superconductivity in spin-polarised surface states of topological semimetal β-PdBi<sub>2</sub>*”  
K. Iwaya, Y. Kohsaka, K. Okawa, T. Machida, M. S. Bahramy, **T. Hanaguri**, and T. Sasagawa  
Nature Commun. **8**, 976 (2017). <https://doi.org/10.1038/s41467-017-01209-9>
  21. “*Orbital-dependent quasiparticle scattering interference in 3R-NbS<sub>2</sub>*”  
T. Machida, Y. Kohsaka, K. Iwaya, R. Arita, **T. Hanaguri**, R. Suzuki, M. Ochi, and Y. Iwasa  
Phys. Rev. B **96**, 075206 (2017). <https://doi.org/10.1103/PhysRevB.96.075206>

22. “Spin-orbit scattering visualized in quasiparticle interference”  
Y. Kohsaka, T. Machida, K. Iwaya, M. Kanou, **T. Hanaguri**, and T. Sasagawa  
Phys. Rev. B **95**, 115307 (2017). <https://doi.org/10.1103/PhysRevB.95.115307>
23. “Bipartite electronic superstructures in the vortex core of  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”  
T. Machida, Y. Kohsaka, K. Matsuoka, K. Iwaya, **T. Hanaguri** and T. Tamegai  
Nature Commun. **7**, 11747 (2016). <https://doi.org/10.1038/ncomms11747>
24. “Observation of Zeeman effect in topological surface state with distinct material dependence”  
Ying-Shuang Fu, **T. Hanaguri**, K. Igarashi, M. Kawamura, M. S. Bahramy, and T. Sasagawa  
Nature Commun. **7**, 10829 (2016). <https://doi.org/10.1038/ncomms10829>
25. “Evidence for Time-Reversal Symmetry Breaking of the Superconducting State near Twin-Boundary Interfaces in FeSe Revealed by Scanning Tunneling Spectroscopy”  
T. Watashige, Y. Tsutsumi, **T. Hanaguri**, Y. Kohsaka, S. Kasahara, A. Furusaki, M. Sgrist, C. Meingast, T. Wolf, H. v. Löhneysen, T. Shibauchi, and Y. Matsuda  
Phys. Rev. X **5**, 031022 (2015). <https://doi.org/10.1103/PhysRevX.5.031022>
26. “Imaging ambipolar two-dimensional carriers induced by the spontaneous electric polarization of a polar semiconductor  $\text{BiTeP}$ ”  
Y. Kohsaka, M. Kanou, H. Takagi, **T. Hanaguri**, and T. Sasagawa  
Phys. Rev. B **91**, 245312 (2015). <https://doi.org/10.1103/PhysRevB.91.245312>
27. “Field induced superconducting phase of FeSe in the BCS-BEC crossover”  
S. Kasahara, T. Watashige, **T. Hanaguri**, Y. Kohsaka, T. Yamashita, Y. Shimoyama, Y. Mizukami, R. Endo, H. Ikeda, K. Aoyama, T. Terashima, S. Uji, T. Wolf, H. v. Löhneysen, T. Shibauchi and Y. Matsuda  
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28. “Imaging the two-component nature of Dirac–Landau levels in the topological surface state of  $\text{Bi}_2\text{Se}_3$ ”  
Ying-Shuang Fu, M. Kawamura, K. Igarashi, H. Takagi, **T. Hanaguri** and T. Sasagawa  
Nature Phys. **10**, 815-819 (2014). <https://doi.org/10.1038/nphys3084>
29. “Superconductivity in an electron band just above the Fermi level: possible route to BCS-BEC superconductivity”  
K. Okazaki, Y. Ito, Y. Ota, Y. Kotani, T. Shimojima, T. Kiss, S. Watanabe, C.-T. Chen, S. Niitaka, **T. Hanaguri**, H. Takagi, A. Chainani and S. Shin  
Scientific Reports **4**, 4109 (2014). <https://doi.org/10.1038/srep04109>
30. “Memory effect in a topological surface state of  $\text{Bi}_2\text{Te}_2\text{Se}$ ”  
Ying-Shuang Fu, **Tetsuo Hanaguri**, Shuhei Yamamoto, Kyushiro Igarashi, Hidenori Takagi and Takao Sasagawa  
ACS Nano **7**, 4105-4110 (2013). <https://doi.org/10.1021/nn400378f>
31. “Evidence for a  $\cos(4\phi)$  Modulation of the Superconducting Energy Gap of Optimally Doped  $\text{FeTe}_{0.6}\text{Se}_{0.4}$  Single Crystals Using Laser Angle-Resolved Photoemission Spectroscopy”,  
K. Okazaki, Y. Ito, Y. Ota, Y. Kotani, T. Shimojima, T. Kiss, S. Watanabe, C. -T. Chen, S. Niitaka, **T. Hanaguri**, H. Takagi, A. Chainani and S. Shin  
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32. “*Scanning tunneling microscopy/spectroscopy of vortices in LiFeAs*”,  
**T. Hanaguri**, K. Kitagawa, K. Matsubayashi, Y. Mazaki, Y. Uwatoko and H. Takagi  
Phys. Rev. B **85**, 214505 (2012). <https://doi.org/10.1103/PhysRevB.85.214505>
33. “*Visualization of the emergence of the pseudogap state and the evolution to superconductivity in a lightly hole-doped Mott insulator*”,  
Y. Kohsaka, **T. Hanaguri**, M. Azuma, M. Takano, J. C. Davis and H. Takagi  
Nature Phys. **8**, 534-538 (2012). <https://doi.org/10.1038/nphys2321>
34. “*Momentum-resolved Landau-level spectroscopy of Dirac surface state in Bi<sub>2</sub>Se<sub>3</sub>*”,  
**T. Hanaguri**, K. Igarashi, M. Kawamura, H. Takagi and T. Sasagawa  
Phys. Rev. B **82**, 081305(R) (2010). <https://doi.org/10.1103/PhysRevB.82.081305>
35. “*Unconventional s-Wave Superconductivity in Fe(Se,Te)*”,  
**T. Hanaguri**, S. Niitaka, K. Kuroki and H. Takagi  
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36. “*Coherence Factors in a High-T<sub>c</sub> Cuprate Probed by Quasi-particle Scattering off Vortices*”,  
**T. Hanaguri**, Y. Kohsaka, M. Ono, M. Maltseva, P. Coleman, I. Yamada, M. Azuma, M. Takano, K. Ohishi and H. Takagi  
Science **323**, 923-926 (2009). <https://doi.org/10.1126/science.1166138>
37. “*Quasiparticle interference and superconducting gap in Ca<sub>2-x</sub>Na<sub>x</sub>CuO<sub>2</sub>Cl<sub>2</sub>*”,  
**T. Hanaguri**, Y. Kohsaka, J. C. Davis, C. Lupien, I. Yamada, M. Azuma, M. Takano, K. Ohishi, M. Ono and H. Takagi  
Nature Phys. **3**, 865-871 (2007). <https://doi.org/10.1038/nphys753>
38. “*Charge-order-maximized momentum-dependent superconductivity*”,  
T. Kiss, T. Yokoya, A. Chainani, S. Shin, **T. Hanaguri**, M. Nohara and H. Takagi  
Nature Phys., **3**, 720-725 (2007). <https://doi.org/10.1038/nphys699>
39. “*Local Tunneling Spectroscopy across a Metamagnetic Critical Point in the Bilayer Ruthenate Sr<sub>3</sub>Ru<sub>2</sub>O<sub>7</sub>*”,  
K. Iwaya, S. Satow, **T. Hanaguri**, N. Shannon, Y. Yoshida, S. I. Ikeda, J. P. He, Y. Kaneko, Y. Tokura, T. Yamada and H. Takagi  
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40. “*An Intrinsic Bond-Centered Electronic Glass with Unidirectional Domains in Underdoped Cuprates*”,  
Y. Kohsaka, C. Taylor, K. Fujita, A. Schmidt, C. Lupien, **T. Hanaguri**, M. Azuma, M. Takano, H. Eisaki, H. Takagi, S. Uchida and J. C. Davis  
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41. “*A ‘checkerboard’ electronic crystal state in lightly hole-doped Ca<sub>2-x</sub>Na<sub>x</sub>CuO<sub>2</sub>Cl<sub>2</sub>*”,  
**T. Hanaguri**, C. Lupien, Y. Kohsaka, D. -H. Lee, M. Azuma, M. Takano, H. Takagi and J. C. Davis,  
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42. “*Evolution of local electronic states from a metal to a correlated insulator in a NiS<sub>2-x</sub>Se<sub>x</sub> solid solution*”  
K. Iwaya, Y. Kohsaka, S. Satow, **T. Hanaguri**, S. Miyasaka and H. Takagi  
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43. “*Imaging nano-scale electronic inhomogeneity in lightly doped Mott insulator Ca<sub>2-x</sub>Na<sub>x</sub>CuO<sub>2</sub>Cl<sub>2</sub>*”,

- Y. Kohsaka, K. Iwaya, S. Satow, **T. Hanaguri**, K. Kitazawa, M. Azuma, M. Takano and H. Takagi, Phys. Rev. Lett. **93**, 097004 (2004). <https://doi.org/10.1103/PhysRevLett.93.097004>
44. “High-field state of the flux-line lattice in the unconventional superconductor CeCoIn<sub>5</sub>”  
T. Watanabe, Y. Kasahara, K. Izawa, T. Sakakibara, Y. Matsuda, C. J. van der Beek, **T. Hanaguri**, H. Shishido, R. Settai and Y. Onuki  
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45. “Anisotropy of the Superconducting Gap of the Borocarbide Superconductor YNi<sub>2</sub>B<sub>2</sub>C with Ultrasonic Attenuation”,  
Tadataka Watanabe, Minoru Nohara, **Tetsuo Hanaguri** and Hidenori Takagi,  
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46. “An instrument for low- and variable-temperature millimeter-wave surface impedance measurements under magnetic fields”,  
**T. Hanaguri**, K. Takaki, Y. Tsuchiya and A. Maeda  
Rev. Sci. Instrum. **74**, 4436-4441 (2003). <https://doi.org/10.1063/1.1606539>
47. “Angle-Resolved Photoemission Spectroscopy of (Ca,Na)<sub>2</sub>CuO<sub>2</sub>Cl<sub>2</sub> Crystals: Fingerprints of a Magnetic Insulator in a Heavily Underdoped Superconductor”,  
Yuhki Kohsaka, Takao Sasagawa, Filip Ronning, Teppei Yoshida, Changyoung Kim, **Tetsuo Hanaguri**, Masaki Azuma, Mikio Takano, Zhi Xun Shen and Hidenori Takagi  
J. Phys. Soc. Jpn. **72**, 1018-1021 (2003). <https://doi.org/10.1143/JPSJ.72.1018>
48. “Observations of electronic inhomogeneity in heavily Pb-doped Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>y</sub> single crystals by scanning tunneling microscopy”,  
G. Kinoda, T. Hasegawa, S. Nakao, **T. Hanaguri**, K. Kitazawa, K. Shimizu, J. Shimoyama and K. Kishio  
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49. “Electronic structures of two-phase microstructures  $\alpha$  and  $\beta$  in heavily Pb-doped Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>y</sub> single crystals investigated by scanning tunneling microscopy/spectroscopy”  
G. Kinoda, T. Hasegawa, S. Nakano, **T. Hanaguri**, K. Shimizu, J. Shimoyama and K. Kishio  
Appl. Phys. Lett. **83**, 1178-1180 (2003). <https://doi.org/10.1063/1.1594826>
50. “Effects of superconducting gap anisotropy on the flux flow resistivity in Y(Ni<sub>1-x</sub>Pt<sub>x</sub>)<sub>2</sub>B<sub>2</sub>C”,  
K. Takaki, A. Koizumi, **T. Hanaguri**, M. Nohara, H. Takagi, K. Kitazawa, Y. Kato, Y. Tsuchiya, H. Kitano and A. Maeda  
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51. “Growth of Na-doped Ca<sub>2</sub>CuO<sub>2</sub>Cl<sub>2</sub> single crystals under high pressures of several GPa”,  
Y. Kohsaka, M. Azuma, I. Yamada, T. Sasagawa, **T. Hanaguri**, M. Takano and H. Takagi,  
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52. “Direct evidence of the anisotropic structure of vortices interacting with columnar defects in high-temperature superconductors through the analysis of Lorentz images”  
O. Kamimura, H. Kasai, T. Akashi, T. Matsuda, K. Harada, J. Masuko, T. Yoshida, N. Osakabe, A. Tonomura, M. Beleggia, G. Pozzi, J. Shimoyama, K. Kishio, **T. Hanaguri**, K. Kitazawa, M. Sasase and S.

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53. "Observation of structures of chain vortices inside anisotropic high- $T_c$  superconductors",  
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54. "Location-sensitive measurement of the local fluctuation of driven vortex density in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ ",  
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55. "Microwave and millimeter wave spectroscopy in the slightly hole-doped ladders of  $\text{Sr}_{14}\text{Cu}_{24}\text{O}_{41}$ ",  
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56. "Oscillating rows of vortices in superconductors",  
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57. "Observation of individual vortices trapped along columnar defects in high-temperature superconductors",  
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58. "Electronic state of vortices in  $\text{YBa}_2\text{Cu}_3\text{O}_y$  investigated by complex surface impedance measurements",  
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59. "Interlayer phase correlation of a vortex system around the coupling transition in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$  containing columnar defects",  
Y. Tsuchiya, **T. Hanaguri**, H. Yasuda, A. Maeda, M. Sasase, K. Hojou, D. G. Steel, J. U. Lee and D. J. Hofman,  
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60. "In-plane charge dynamics in  $\text{La}_{1.6-x}\text{Nd}_{0.4}\text{Sr}_x\text{CuO}_4$ : Absence of a charge gap in the spin/charge ordered state",  
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61. "Reduction of the superfluid density in the vortex-liquid phase of  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ ",  
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62. "Field dependence of penetration depth in an electron-doped cuprate superconductor  $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$  with



$x=0.16$ ”,

A. Maeda, H. Yasuda and **T. Hanaguri**,

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## **Books, Commentaries, Bulletins, etc.**

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2. “分光イメージング走査型トンネル顕微鏡”,  
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3. “*IT-TaS<sub>2</sub> の電荷密度波・積層自由度・電子相関 -STM/STS で見る絶縁性の起源と電子状態-*”,  
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10. “*STM/STS で見た鉄系超伝導体の超伝導体ギャップ*”,  
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11. “超伝導体を探る針〜分光イメージング走査型トンネル顕微鏡〜”,  
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12. “*STM で見る高温超伝導体の渦芯*”,  
**花栗哲郎**,  
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13. “*Dual realities in superconductors*”,



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14. “電子分光用走査型トンネル顕微鏡”,  
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15. “強相関酸化物表面の電子状態”,  
**花栗哲郎**,  
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16. “高温超伝導体中に形成された電子結晶”,  
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17. “磁区・磁束の直接観察”,  
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19. “Magnetic field dependence of the surface impedance in superconductors”,  
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22. “Ultrasonic and NQR studies of structural phase transitions and superconductivity in  $La_{2-x}(Ba,Sr)_xCuO_4$ ”,  
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## **Invited Presentations**

1. “*Superconducting Gaps in Fe(S,Se,Te)*”

**Tetsuo Hanaguri**

Iron-based Superconductors: Advances towards applications 2025, Feb. 13 – 15, 2025, Miyazaki, Japan.

2. “*超低温 STM が可能にする超伝導研究の新展開*”

**花栗哲郎**

基研研究会「超伝導研究の新潮流」, 2024 年 12 月 18 日 - 20 日, 京都大学.

3. “*Searching for unconventional electronic states by high-resolution spectroscopic-imaging scanning tunneling microscopy*”

**Tetsuo Hanaguri**

International Conference on the Fundamentals of Quantum Matter, Nov. 17 – 21, 2024, Beijing, China.

4. “*低温強磁場 STM による物性研究の 最近の展開*”

**花栗哲郎**

第 53 回薄膜・表面物理 基礎講座 走査プローブ顕微鏡による表面・界面研究：基礎と応用, 2024 年 11 月 13 日, 早稲田大学.

5. “*Emergent momentum dependence of the superconducting gap in twisted stacks of NbSe<sub>2</sub>/graphene*”

**Tetsuo Hanaguri**

Novel Superconductors 2024: Materials, properties, applications and perspectives, Oct. 7 – 11, 2024, Dresden, Germany.

6. “*Spectroscopic-imaging scanning tunneling microscopy on quantum liquid crystals*”

**Tetsuo Hanaguri**

Condensed Matter and Quantum Materials 2024 (CMQM 2024), July 2 – 5, 2024, St Andrews, UK.

7. “*Modifying the superconducting gap in 1H-NbSe<sub>2</sub>/graphene heterostructures by twist*”

Masahiro Naritsuka, Tadashi Machida, Shun Asano, Youichi Yanase, and **Tetsuo Hanaguri**

Superstripes 2024 Quantum Complex Matter, June 24 – 29, 2024, Ischia, Italy. (*presented online*)

8. “*Controlling the Superconducting Gap in NbSe<sub>2</sub>/Graphene Twisted Heterostructures*”

**Tetsuo Hanaguri**

15th International Conference on Atomically Controlled Surfaces, Interfaces and Nanostructures (ACSIN-15), May. 11 – 12, 2024, Suzhou, China.

9. “*Electronic nematicity investigated by spectroscopic-imaging STM*”

**Tetsuo Hanaguri**

Fudan International Workshop on Complex Quantum Materials, Nov. 27 – 28, 2023, Shanghai, China.

10. “*Toward Unambiguous Identification of Majorana Zero Mode in the Vortex Core*”

**Tetsuo Hanaguri**

Gordon Research Conference on Topological and Correlated Matter, May 28 – June 2, 2023, Ventura, USA.

11. “*Possible Majorana Zero Mode in the Vortex Cores of Fe(Se, Te)*”

**T. Hanaguri**

29th International Conference on Low Temperature Physics (LT29), Aug. 18 – 24, 2022, Sapporo, Japan.

12. “*Superconductivity, Nematicity and Topology in Fe(S,Se,Te)*”

**T. Hanaguri**

13th International Conference on Materials and Mechanisms of Superconductivity & High Temperature Superconductors, July 17 – 22, 2022, Vancouver, Canada.

13. “*STM studies of iron-based topological superconductors*”

**T. Hanaguri**

American Physical Society March Meeting 2022, March 14 – 18, 2022, Chicago, USA. (*Online*)

14. “*Fe(Se,Te)における超伝導・ネマティシティ・バンドトポロジーの関係*”

**花栗哲郎**

基研研究会「非自明な電子状態が生み出す超伝導現象の最前線：新たな挑戦と展望」, 2021年12月22日 - 24日, 京都大学.

15. “*Ultrahigh energy resolution scanning tunneling microscopy and its application to the search for Majorana quasiparticles*”

**T. Hanaguri**

The 10th Vacuum and Surface Sciences Conference of Asia and Australia (VASSCAA-10) & the Chinese Vacuum Conference 2021 (CVS 2021), Oct. 12 – 14, 2021, Shanghai, China. (*Online*)

16. “*分光イメージング走査型トンネル顕微鏡で見た Fe(S,Se,Te) の多様な超伝導状態*”

**花栗哲郎**

日本物理学会 2021 年秋季大会 2021 年 9 月 20 – 9 月 23 日, オンライン.

17. “*High-field superconducting phase in FeSe investigated by spectroscopic-imaging scanning tunneling microscopy*”

**T. Hanaguri**

18th Online International Vortex Conference 2021 (Vortex 2021), May 27 – June 3, 2021, Kanpur, India. (*Online*)

18. “*Spectroscopic-imaging STM studies of FeSe and related materials*”

**T. Hanaguri**

International Conference on Fugaku project Emergence and Functionality of Quantum Matter 2020, Sept. 29 – Oct. 2, 2020, Tokyo, Japan. (*Online*)

19. “*Emergent superconducting states in Fe(Se,S) investigated by spectroscopic-imaging STM*”

**T. Hanaguri**

International Workshop: Theoretical Developments and Experimental Progresses in Quantum Matter: Dynamics of Quantum Magnetism, Aug. 26 – 30, 2020, Shanghai, China. (*Online*)

20. “*鉄系超伝導体 FeSe における新奇超伝導状態*”

**花栗哲郎**

つくば-柏-本郷 超伝導かけはしプロジェクトワークショップ (3) 2020 年 1 月 16 – 1 月 17 日, 物質・材料研究機構.

21. “*Zero-energy bound states in the vortex core and at excess irons in Fe(Se,Te)*”

**T. Hanaguri**

APW 2019 & Tsinghua-RIKEN-KITS joint workshop, Dec. 6 – 8, 2019, Beijing, China.

22. “*Zero-energy bound states in the vortex core and at excess irons in Fe(Se,Te)*”

- T. Machida, Y. Sun, S. Pyon, S. Takeda, Y. Kohsaka, **T. Hanaguri**, T. Sasagawa, and T. Tamegai  
International Conference on Topological Materials Science 2019, Dec. 3 – 7, 2019, Kyoto, Japan.
23. “Nematicity and superconductivity in the iron-based superconductor FeSe”  
**T. Hanaguri**  
IBS-RIKEN Joint Conference, Oct. 17 – 18, 2019, Daejeon, Korea.
24. “Zero-energy vortex bound state in Fe(Se,Te) and its relevance to the Majorana zero mode”  
**T. Hanaguri**  
The Future of Topological Materials, Oct. 2 – 5, 2019, Princeton, USA.
25. “Nematicity, small Fermi energy and superconductivity in FeSe”  
**T. Hanaguri**  
International Conference on Strongly Correlated Electron Systems 2019, Sept. 24 – 28, 2019, Okayama, Japan.
26. “Zero-energy vortex bound state in Fe(Se,Te) and its relevance to the Majorana zero mode”  
**T. Hanaguri**  
AIMR Workshop on Quantum Materials and Spintronics: Spin, Topology and Superconductivity, July 11 – 12, 2019, Sendai, Japan.
27. “On the zero-energy bound state in the vortex cores of Fe(Se,Te)”  
**T. Hanaguri**  
SUPERSTRIPES2019, June 23 – 29, 2019, Ischia, Italy.
28. “Superconductivity, nematicity and BCS-BEC crossover in FeSe<sub>1-x</sub>S<sub>x</sub>”  
**T. Hanaguri**  
Spectroscopies in Novel Superconductors (SNS2019), June 16-21, 2019, Tokyo, Japan.
29. “Zero-energy vortex bound states in the topological superconductor Fe(Se,Te) investigated by ultra-low temperature STM”  
**T. Hanaguri**  
Interacting Majorana Fermions, May 2-3, 2019, Vancouver, Canada.
30. “鉄系超伝導体の超伝導ギャップ構造 - 異方性と位相”  
**花栗哲郎**  
日本物理学会第 74 回年次大会 2019 年 3 月 14 日 - 3 月 17 日, 九州大学.
31. “トポロジカル超伝導体 Fe(Se,Te) におけるゼロエネルギー渦糸束縛状態”  
**花栗哲郎**  
第 4 回「トポロジーが紡ぐ物質科学のフロンティア」領域研究会 2019 年 1 月 22 日 - 1 月 24 日, 名古屋大学.
32. “Nature of the Zero-Energy Vortex Bound State in Fe(Se,Te)”  
**T. Hanaguri**  
The Kavli ITS Workshop on Majorana Modes in Topological Superconductors, Jan. 8-11, 2019, Beijing, China.
33. “Superconductivity, nematicity and BCS-BEC crossover in Fe(Se,S)”  
**T. Hanaguri**

- Fourteenth International Conference on Electronic Spectroscopy and Structure, Oct. 8-12, 2018, Shanghai, China.
34. *"Spectroscopic-imaging STM studies of a BCS-BEC crossover superconductor FeSe"*  
**T. Hanaguri**  
International Workshop: New Developments in STM on Surfaces of Functional Materials, Aug. 26-28, 2018, Shanghai, China.
35. *"What controls the zero-energy bound state in the vortex core of Fe(Se,Te)?"*  
**T. Hanaguri**  
Workshop in the Kavli Institute for Theoretical Sciences "New Frontiers of Strongly Correlated Electron Materials", Aug. 6-24, 2018, Beijing, China.
36. *"Spectroscopic - Imaging STM Studies of Nematicity and Superconductivity in FeSe<sub>1-x</sub>S<sub>x</sub>"*  
**T. Hanaguri**  
The 12th International Conference on Materials and Mechanisms of Superconductivity and High Temperature Superconductors (M<sup>2</sup>S-2018), Aug. 19-24, 2018, Beijing, China.
37. *"Spectroscopic-Imaging STM Studies of Nematicity and Superconductivity in FeSe<sub>1-x</sub>S<sub>x</sub>"*  
**T. Hanaguri**  
SPSTM-7 & LTSPM-1 International Conference 2018, July 28-30, 2018, Nijmegen, The Netherlands.
38. *"Fe(Se,S)における回転対称性の破れと超伝導"*  
**花栗哲郎**  
日本物理学会第 73 回年次大会 2018 年 3 月 22 日 - 3 月 25 日, 東京理科大学.
39. *"Scanning Tunneling Microscopy as a Tool for Superconductivity Research"*  
**T. Hanaguri**  
30th International Symposium on Superconductivity (ISS2017), Dec. 13-15, 2017, Tokyo, Japan.
40. *"STM studies of superconductivity and nematicity in FeSe<sub>1-x</sub>S<sub>x</sub>"*  
**T. Hanaguri**  
SUPERSTRIPES2017, June 4 – 10, 2017, Ischia, Italy.
41. *"Spectroscopic-imaging STM studies of superconductivity and nematicity in FeSe<sub>1-x</sub>S<sub>x</sub>"*  
**T. Hanaguri**  
APCTP-Quantum Materials Symposium 2017, Feb. 22 – 24, 2017, Yongpyong resort, Korea.
42. *"Spectroscopic-imaging STM Studies on Dirac-Landau Levels in the Topological Surface State"*  
**T. Hanaguri**  
The AVS 63rd International Symposium & Exhibition, Nov. 6 – 11, 2016, Nashville, USA.
43. *"分光イメージングSTM による非従来型超伝導体 FeSe の研究"*  
**花栗哲郎**  
物性研短期研究会「走査トンネル顕微鏡による物性研究の現状と展望」, 2016 年 10 月 31 日 – 11 月 1 日, 東京大学.
44. *"極限環境分光イメージングSTM による電子状態解析"*  
**花栗哲郎**  
日本表面科学会関東支部 第 4 回関東支部セミナー 表面・薄膜分析シリーズ Vol.2 「走査型プロ

- ーブ顕微鏡のフロンティア ～実用材料表面計測入門から最新物性問題への挑戦まで～」, 2016年10月18日, 東京大学.
45. “*分光イメージングSTM で見た FeSe の超伝導ギャップ*”  
**花栗哲郎**  
基研研究会「超伝導研究の最先端：多自由度、非平衡、電子相関、トポロジー」, 2016年10月10日 - 12日, 京都大学.
46. “*Spectroscopic-imaging STM studies of the iron chalcogenide superconductor FeSe*”  
**T. Hanaguri**  
International Conference on Low-Energy Electrodynamics in Solids, May 29 – June 3, 2016, Moriyama, Japan.
47. “*Spectroscopic-imaging STM studies of Friedel oscillations in FeSe*”  
**T. Hanaguri**  
COST MP-1201 NanoSC Workshop Probing Superconductivity at the Nanoscale: New Advances, Apr. 12 - 15, 2016, Saas Fee, Switzerland.
48. “*STM/STS で見た FeSe の超伝導状態とネマティック状態*”  
**花栗哲郎**  
日本物理学会第71回年次大会 2016年3月19日 - 3月22日, 東北学院大学.
49. “*STM/STS による量子物質の電子状態解析*”  
**花栗哲郎**  
物性研短期研究会「量子物質研究の最前線」, 2015年12月8日 - 12月9日, 東京大学.
50. “*Magnetic-field effects on Dirac electrons at the surfaces of topological insulators*”  
**Tetsuo Hanaguri**  
The 15th International Conference on the Formation of Semiconductor Interfaces (ICFSI-15), Nov. 15 - 20, 2015, Hiroshima, Japan.
51. “*Quasiparticle interference and superconducting gap in the nodal iron-based superconductor FeSe*”  
**Tetsuo Hanaguri**  
Impurity induced states and quasiparticle interference in unconventional superconductors and strong spin-orbit coupled systems, Oct. 18 - 23, 2015, Pohang, Korea.
52. “*Friedel oscillations in the normal and superconducting states of FeSe*”  
**Tetsuo Hanaguri**  
Workshop on the two-dimensional chalcogenides: exotic electronic orders, superconductivity and magnetism, Aug. 31 - Sept. 3, 2015, Dresden, Germany.
53. “*Imaging the wave functions of Dirac-Landau levels in the topological surface state*”  
**Tetsuo Hanaguri**  
Symposium of New Perspectives in Spintronic and Mesoscopic Physics, June 10 - 12, 2015, Kashiwa, Japan.
54. “*Quasi-Particle Interference and Superconducting Gap in FeSe*”  
**Tetsuo Hanaguri**  
Gordon Research Conference on Superconductivity, May 24-29, 2015, Hong Kong, China.

55. “Spectroscopic-Imaging STM studies of Vortices in FeSe”  
**Tetsuo Hanaguri**  
International Workshop on Vortex Matter in Superconductors -VORTEX 2015, May 10 - 15, 2015, El Escorial, Spain.
56. “走査型トンネル分光の発展と高温超伝導”  
**花栗哲郎**  
第 62 回応用物理学会春季学術講演会, 2015 年 3 月 11 日 - 14 日, 東海大学.
57. “Superconducting gap and quasi-particle interference in FeSe”  
**T. Hanaguri**, T. Watashige, Y. Kohsaka, K. Iwaya, Y. Fu, S. Kasahara, D. Watanabe, Y. Mizukami, T. Mikami, Y. Kawamoto, S. Kurata, T. Shibauchi, Y. Matsuda, A. Böhrer, T. Wolf, P. Adelman, C. Meingast, H. v. Löhneysen  
27th International Symposium on Superconductivity, Nov. 25 - 27, 2014, Funabori, Japan.
58. “Superconducting gap and quasi-particle interference in FeSe”  
**T. Hanaguri**  
International Symposium on Frontier of Superconductivity Research (IV), STM on Unconventional Superconductors, Oct. 23 - 26, 2014, Beijing, China.
59. “FeSe の準粒子干渉と超伝導ギャップ”  
**花栗哲郎**  
基研研究会「多自由度電子状態と電子相関が生み出す新奇超伝導の物理」, 2014 年 10 月 21 日 - 22 日, 京都大学.
60. “Electronic states of FeSe studied by STM/STS”  
**T. Hanaguri**, T. Watashige, Y. Kohsaka, K. Iwaya, T. Machida, S. Kasahara, D. Watanabe, Y. Mizukami, T. Mikami, Y. Kawamoto, S. Kurata, T. Shibauchi, Y. Matsuda, A. Böhrer, T. Wolf, P. Adelman, C. Meingast, and H. v. Löhneysen  
Research Frontier of Transition-metal Compounds Opened by Advanced Spectroscopies, Sept. 30 - Oct. 2, 2014, Sendai, Japan.
61. “STM/STS studies on topological insulators”  
**T. Hanaguri**  
The Fall Meeting of the European Materials Research Society, Sept. 15-18, 2014, Warsaw, Poland.
62. “Spectroscopic-imaging scanning tunneling microscopy on FeSe single crystals”  
**T. Hanaguri**, T. Watashige, Y. Kohsaka, K. Iwaya, Y. Fu, S. Kasahara, D. Watanabe, Y. Mizukami, T. Mikami, Y. Kawamoto, S. Kurata, T. Shibauchi, Y. Matsuda, A. Böhrer, T. Wolf, P. Adelman, C. Meingast, and H. v. Löhneysen  
The Beijing International Workshop (II) on Iron-Based Superconductors, Aug. 4-8, 2014, Beijing, China.
63. “Superconducting Gap and Quasi-Particle Interference in FeSe”  
**T. Hanaguri**, T. Watashige, Y. Kohsaka, K. Iwaya, Y. Fu, S. Kasahara, D. Watanabe, Y. Mizukami, T. Mikami, Y. Kawamoto, S. Kurata, T. Shibauchi, Y. Matsuda, A. Böhrer, T. Wolf, P. Adelman, C. Meingast, and H. v. Löhneysen  
The 4th International Conference of Superconductivity and Magnetism, Apr. 27 - May 2, 2014, Antalya,



- Turkey.
64. “トポロジカル絶縁体表面 Dirac 電子の磁場中波動関数 イメージング”  
**花栗哲郎**  
物性研短期研究会「極限強磁場科学 - 場、物質、プローブのリンクから融合へ」, 2013 年 10 月 30 日 - 11 月 1 日, 東京大学.
65. “STM/STS でみた FeSe の超伝導ギャップ”  
**花栗哲郎**  
基研研究会「鉄系高温超伝導の物理」, 2013 年 10 月 8 日 - 10 月 9 日, 京都大学.
66. “Scanning probes studies of pnictides and pairing symmetry identification”  
**T. Hanaguri,**  
Superconductivity, the Second Century, Aug. 5-30, 2013, Stockholm, Sweden.
67. “Electronic states of defects and vortices in an iron-based superconductor”  
**T. Hanaguri**  
Superconductivity research advanced by new materials and spectroscopies, July 23-25, 2013, Sendai, Japan.
68. “STM/STS studies of superconducting gap in unconventional superconductors”  
**T. Hanaguri**  
Workshop "Scanning Probe Microscopy for the Study of Quantum Materials", June 28-30, 2013, Vancouver, Canada.
69. “Defect states and superconducting gap in an iron-based superconductor”  
**T. Hanaguri,** K. Kitagawa, K. Matsubayashi, Y. Uwatoko and H. Takagi  
Spectroscopy on Novel Superconductors (SNS2013), June 24-28, 2013, Berkeley, USA.
70. “トポロジカル絶縁体における Dirac 表面状態の Landau 準位”  
**花栗哲郎**  
2013 年度 基研研究会「固体中におけるディラック電子系物理の新展開」 2013 年 6 月 19 日 - 6 月 21 日, 京都大学.
71. “Vortex and impurity electronic states in LiFeAs”  
**T. Hanaguri,** K. Kitagawa, K. Matsubayashi, Y. Uwatoko and H. Takagi  
14th International Workshop on Vortex Matter in Superconductors, May 21-28, 2013, Nanjing, China.
72. “Landau-level spectroscopies on topological insulators”  
**T. Hanaguri**  
3rd Japan-Israel Binational Workshop on Quantum Phenomena, Mar. 10-13, 2013, Onna, Japan.
73. “トポロジカル絶縁体の実験 : STM/STS の観点から”  
**花栗哲郎**  
日本物理学会 2012 年秋季大会 2012 年 9 月 18 日 - 9 月 21 日, 横浜国立大学.
74. “Landau-level spectroscopies on topological insulators”  
**T. Hanaguri**  
Eurasia-Pacific Summer School and Conference on Strongly Correlated Electrons, Aug. 6-17, 2012, Turunç, Turkey.

75. *“Experimental trends in cuprates and pnictides: STM”*  
**T. Hanaguri**  
International Conference on Materials and Mechanisms of Superconductivity (M2S 2012), July 29-Aug. 3, 2012, Washington DC, USA.
76. *“STM/STS studies on topological insulators under magnetic fields”*  
**T. Hanaguri**  
International Seminar and Workshop on Quantum Matter from the Nano- to the Macroscale, June 25-29, 2012, Dresden, Germany.
77. *“STM/STS でみた LiFeAs の磁束状態”*  
**花栗哲郎**  
基研研究会「鉄系高温超伝導の物理～スピン・軌道・格子～」, 2012年6月21日 - 6月22日, 京都大学.
78. *“STM/STS Studies of topological insulators under magnetic fields”*  
**T. Hanaguri**  
International conference on topological quantum phenomena (TQP2012), May. 16-20, 2012, Nagoya, Japan.
79. *“STM/STS studies of LiFeAs”*  
**T. Hanaguri**  
International Workshop “Iron-Based Superconductors”, Mar. 21-23, 2012, Munich, Germany.
80. *“トポロジカル表面状態の磁場中 STM/STS”*  
**花栗哲郎**  
ISSP ワークショップ「トポロジカル絶縁体の表面電子状態」, 2012年2月23日 - 2月24日, 東京大学.
81. *“STM/STS Studies of a Topological Insulator in a Magnetic field”*  
**T. Hanaguri**  
FIRST QS2C Theory Forum "RIKEN-APW-APCTP Joint Workshop", Jan. 14-16, 2012, Wako, Japan.
82. *“STM/STS studies of Landau quantization in a topological insulator”*  
**T. Hanaguri**  
The 2nd ASRC International Workshop on Magnetic Materials and Nanostructures, Jan. 10-13, 2012, Tokai, Japan.
83. *“Magnetic Field Effects on a Topological Insulator Studied by STM/STS”*  
**T. Hanaguri**  
19th International Colloquium on Scanning Probe Microscopy, Dec. 19-21, 2011, Toyako, Japan.
84. *“STM/STS studies of a topological insulator”*  
**T. Hanaguri**  
Novel Quantum States in Condensed Matter 2011 (NQS2011), Nov. 21-25, 2011, Kyoto, Japan.
85. *“分光イメージングSTM を用いた電子状態の研究”*  
**花栗哲郎**  
第二回表面科学若手研究会, 2011年11月19日 - 11月20日, 理化学研究所.

86. *"STM/STS studies of Dirac surface state in Bi<sub>2</sub>Se<sub>3</sub> under magnetic fields"*  
**T. Hanaguri**  
Topological Insulators and Superconductors, Aug. 18-21, 2011, Beijing, China.
87. *"Spectroscopic-Imaging STM Studies of Superconducting Gap in Unconventional Superconductors"*  
**T. Hanaguri**  
The 26th International Conference on Low Temperature Physics, Aug. 10-17, 2011, Beijing, China.
88. *"STM/STS Studies of Defects and Vortices in LiFeAs"*  
**T. Hanaguri**  
The International Conference on Novel Superconductivity, Aug. 4-9, 2011, Tainan, Taiwan.
89. *"STM/STS Studies of Defects and Vortices in LiFeAs"*  
**T. Hanaguri**, K. Kitagawa, K. Matsubayashi, Y. Mazaki, Y. Uwatoko, M. Takigawa, Bumsung Lee, Seunghyun Khim, Kee Hoon Kim and H. Takagi  
Search for new physics in transition metal compounds by spectroscopies, July 28-30, 2011, Sendai, Japan.
90. *"STM/STS studies on iron-based superconductors"*  
**T. Hanaguri**  
The 4th workshop for Emergent Materials Research, July 11-13, 2011, Pohang, Korea.
91. *"Landau quantization of Dirac fermions in a topological insulator"*  
**T. Hanaguri**  
The 4th international workshop on Emergent Phenomena of Quantum Hall Systems, June 23-25, 2011, Beijing, China.
92. *"STM/STS で見た鉄系超伝導体の超伝導ギャップ"*  
**花栗哲郎**  
基研研究会「鉄系高温超伝導の物理」, 2011年6月16日 - 6月17日, 京都大学.
93. *"STM/STS studies of the superconducting gap in iron-based superconductors"*  
**T. Hanaguri**  
Gordon Research Conference on Superconductivity, June 5-10, 2011, Waterville Valley, USA.
94. *"Superconducting gaps of iron-based superconductors investigated by STM/STS"*  
**T. Hanaguri**  
KIAS workshop on "Frontiers in Condensed Matter Physics", May 9-12, 2011, Seoul, Korea.
95. *"STM/STS studies of a topological insulator"*  
**T. Hanaguri**  
KIAS workshop on "Frontiers in Condensed Matter Physics", May 9-12, 2011, Seoul, Korea.
96. *"Landau-level spectroscopies of a topological insulator"*  
**T. Hanaguri**  
2011 APS March Meeting, Mar. 21-25, 2011, Dallas, USA. (Because of the great earthquake on Mar. 11, I could not visit Dallas and I presented via internet.)
97. *"STM/STS studies of the superconducting gap in iron-based superconductors"*  
**T. Hanaguri**  
Aspen Winter Conference "Contrasting Superconductivity of Pnictides and Cuprates", Jan. 22-28, 2011,

- Aspen, USA.
98. “*STM/STS studies on iron-based superconductors*”  
**T. Hanaguri**  
KITP workshop on the Iron-Based Superconductors, Jan. 10-21, 2011, Santa Barbara, USA.
99. “*Landau Quantization of Dirac Surface State in a Topological Insulator*”  
**T. Hanaguri**  
2011 Frontiers in Nanoscale Science and Technology Workshop, Jan. 5-7, 2011, Wako, Japan.
100. “*STM/STS studies on iron-based superconductors*”  
**T. Hanaguri**  
9th Asia-Pacific Workshop on Material Physics, Dec. 13-15, 2010, Hanoi, Vietnam.
101. “*分光イメージングSTM*”  
**花栗哲郎**  
表面・界面スペクトロスコープー2010 2010年12月3日 - 12月4日, 筑波山京成ホテル.
102. “*Phase-sensitive STM studies on cuprate and iron-based superconductors*”  
**T. Hanaguri**  
JSPS A3 Foresight Program Autumn School for Young Scientists, Nov. 7-11, 2010, Kyoto, Japan.
103. “*Spectroscopic-imaging STM studies on unconventional superconductors*”  
**T. Hanaguri**  
Korean Physical Society autumn meeting, October 20-23, 2010, Phoenix Park, Korea.
104. “*Landau-level spectroscopy of Dirac surface state in a topological insulator*”  
**T. Hanaguri**  
SpinAge 2010 Retreat, August 27-31, 2010, Watsonville, USA.
105. “*Spectroscopic-imaging STM studies on unconventional superconductors*”  
**T. Hanaguri**  
18th International Vacuum Congress, August 23-27, 2010, Beijing, China.
106. “*Landau-level spectroscopy of helical Dirac fermions in a topological insulator  $Bi_2Se_3$* ”  
**T. Hanaguri**  
Workshop on Principles and Design of Strongly Correlated Electronic Systems, August 2-13, 2010, Trieste, Italy.
107. “*Phase-sensitive spectroscopic-imaging STM studies of unconventional superconductors*”  
**T. Hanaguri**  
The International Conference on Low-Energy Electrodynamics in Solids 2010, July 5-10, 2010, Les Diablerets, Switzerland.
108. “*Spectroscopic-Imaging Scanning Tunneling Microscopy on Iron-Based Superconductors*”  
**Tetsuo Hanaguri**, Seiji Niitaka, Kazuhiko Kuroki, and Hidenori Takagi  
The 9th International Conference on Spectroscopies in Novel Superconductors, May 24-28, 2010, Shanghai, China.
109. “*Spectroscopic-Imaging STM at High Magnetic Fields*”  
**T. Hanaguri**

6th Annual Nanoprobes Workshop, Center for Probing the Nanoscale, Stanford University, May 14, 2010, Stanford, USA.

110. “分光イメージングSTM で見た鉄系超伝導体のギャップ対称性”

**花栗哲郎**

日本物理学会 2010 年第 65 回年次大会 2010 年 3 月 20 日 - 3 月 23 日, 岡山大学.

111. “分光イメージングSTM を用いた非従来型超伝導の研究”

**花栗哲郎**

文部科学省「最先端・高性能汎用スーパーコンピュータの開発利用」プロジェクト 次世代ナノ統合シミュレーションソフトウェアの研究開発 第 4 回公開シンポジウム, 2010 年 3 月 3 日 - 3 月 4 日, 自然科学研究機構 岡崎コンファレンスセンター.

112. “Spectroscopic-Imaging Scanning Tunneling Microscopy - Emerging Tool for Exploring Electronic States of Complex Materials -”

**T. Hanaguri**

2010 HYU-RIKEN Collaboration Workshop, January 5, 2010, Jeju, Korea.

113. “Sign-reversing *s*-wave Superconductivity in an Iron-based Superconductor Probed by Phase-sensitive STM”

**T. Hanaguri**

The RIKEN Workshop on "Emergent Phenomena of Correlated Materials, December 2-4, 2009, Wako, Japan.

114. “鉄系超伝導体のSTM”

**花栗哲郎**

ワークショップ「鉄系高温超伝導体研究の最前線」～「メカニズムおよび物性のレビューと展望」～, 2009 年 11 月 28 日, 日本原子力研究開発機構システム計算科学センター.

115. “Relationship between the Vortex 'Checkerboard' and the Quasi-Particle Interference in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ ”

**T. Hanaguri**

12th International Workshop on Vortex Matter in Superconductors, Sept. 12-19, 2009, Lake Yamanaka, Japan.

116. “Phase-sensitive quasi-particle interference effects in high- $T_c$  superconductors”

**T. Hanaguri**

9th International Conference on Materials and Mechanisms of Superconductivity (M<sup>2</sup>S-IX), Sept. 7-12, 2009, Tokyo, Japan.

117. “Spectroscopic-imaging STM studies on iron-based superconductors”

**T. Hanaguri**

ICC-IMR workshop "Physics on Transition Metal Based Superconductors", June 24-26, 2009, Sendai, Japan.

118. “Scanning Tunneling Microscopy As A Tool for Exploring The Electronic States of Complex Materials”

**T. Hanaguri**

3rd International Conference on Science and Technology for Advanced Ceramics (STAC3), June 16-18, 2009, Yokohama, Japan.

119. *"Magnetic-field effects on the quasi-particle interference in cuprates"*  
**T. Hanaguri**  
Gordon Research Conference on Superconductivity, June 7-12, 2009, Hong Kong, China.
120. *"Possible Quantum-Limit Vortex Core in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ "*  
**T. Hanaguri**  
Joint JSPS-ESF International Conference on Nanoscience and Engineering in Superconductivity, March 23-26, 2009, Tsukuba, Japan.
121. *"Quasi-Particle Interference Effect as a Probe of the Phase of the Superconducting Gap"*  
**T. Hanaguri**  
AIST-RIKEN Joint Workshop on "Emergent Phenomena of Correlated Materials", March. 4-7, 2009, Okinawa, Japan.
122. *"Spectroscopic-imaging STM on a  $\text{PrFeAsO}_{0.7}$  single crystal"*  
**T. Hanaguri**  
International Workshop on Iron Related High- $T_c$  Superconductors (IRiSes2009), Jan. 25, 2009, Tokyo, Japan.
123. *"STM/STS を用いた新しい対波動関数対称性決定法"*  
**花栗哲郎**  
研究会「鉄ニクタイト物質系における超伝導ペア対称性と超伝導状態」 2009年1月24日, 日本原子力研究開発機構システム計算科学センター.
124. *"Spectroscopic-imaging STM studies of cuprates under high magnetic fields - vortex checkerboard revisited"*  
**T. Hanaguri**  
International Workshop on Inelastic Neutron and X-Ray Scattering in Strongly Correlated Electron Systems, Oct. 1-3, 2008, Sendai, Japan.
125. *"Quasiparticle interference and coherence effects of high- $T_c$  superconductor: STM/STS as a reciprocal-space probe"*  
**花栗哲郎**  
日本物理学会 2008年秋季大会 2008年9月20日 - 9月23日, 岩手大学.
126. *"Superconducting Gap and Coherence Effect of a High- $T_c$  Cuprate  $\text{Ca}_{2-x}\text{Na}_x\text{CuO}_2\text{Cl}_2$  Probed by Quasi-particle Interference"*  
**T. Hanaguri**  
The International Conference on Quantum Phenomena in Complex Matter of the series on Stripes and High  $T_c$  Superconductivity (Stripes08), Jul. 27-31, 2008, Erice, Italy.
127. *"Quasi-particle interference and coherence factors in  $\text{Ca}_{2-x}\text{Na}_x\text{CuO}_2\text{Cl}_2$ "*  
**T. Hanaguri**  
ESF-NES workshop "Probing superconductivity at the nanoscale", June 4-7, 2008, Alicante, Spain.
128. *"Internal structure of vortex core in  $\text{NbSe}_2$ "*  
**T. Hanaguri**  
The 4<sup>th</sup> CREST Nano-Virtual-Labs Joint Workshop on Superconductivity: Critical Currents

- (NVLS2007-CC), Dec. 17-18 2007, Kitakyushu, Japan.
129. “*Quasi-Particle Interference, Superconducting Gap and Coherence Effect in a High- $T_c$  Superconductor  $Ca_{2-x}Na_xCuO_2Cl_2$* ”  
**T. Hanaguri**  
8th Korea-Japan-Taiwan Symposium on Strongly Correlated Electron Systems (KJT-2007), Nov. 15-17 2007, Incheon, Korea.
130. “*Possible combined multi-band and gap-anisotropy effects in the vortex core of  $NbSe_2$* ”  
**T. Hanaguri**  
20th International Symposium on Superconductivity (ISS2007), Nov. 5-7 2007, Tsukuba, Japan.
131. “低温強磁場STMによる強相関電子系の電子状態イメージング”  
**花栗哲郎**  
物性研短期研究会「低温走査トンネル顕微鏡の現状と展望」, 2007年10月12日 - 10月13日, 東京大学.
132. “*d-wave quasi-particle interference and Fermi arc in  $Ca_{2-x}Na_xCuO_2Cl_2$* ”  
**T. Hanaguri**  
The 8th International Conference on Spectroscopies in Novel Superconductors (SNS2007), Aug. 20-24 2007, Sendai, Japan.
133. “*Superconducting gap in a cuprate studied by the quasi-particle interference effect*”  
**T. Hanaguri**  
NSFC-JSPS Joint Conference on Novel Quantum Phenomena in Strongly Correlated Electronic Systems, June 25 -29 2007, Beijing, China.
134. “先端分光法で見る酸化物高温超伝導の電子状態”  
**花栗哲郎**  
超伝導科学技術研究会第33回シンポジウム, 2007年4月17日, 虎ノ門パストラル.
135. “電子状態評価ツールとしてのSTMの高安定化広パラメータ化”  
**花栗哲郎**  
日本表面科学会第54回表面科学研究会, 2007年3月9日, 東京大学.
136. “*Low energy spectroscopic mapping studies on  $Ca_{2-x}Na_xCuO_2Cl_2$* ”,  
**T. Hanaguri**  
Sixth International Conference on New Theories, Discoveries and Applications of Superconductors and Related Materials, Jan. 9-11 2007, Sydney, Australia.
137. “汎用電子状態解像ツールを目指したSTM/STS開発”  
**花栗哲郎**  
第44回茅コンファレンス, 2006年9月8日 - 9月11日, 裏磐梯.
138. “*Electronic “checkerboard” and superconductivity in  $Ca_{2-x}Na_xCuO_2Cl_2$* ”  
**T. Hanaguri**  
International Workshop on Mesoscopic Superconductivity and Magnetism, Aug. 28 - Sept. 1 2006, Chicago, USA.
139. “*Development of high-field STM and its application to the study on magnetically-tuned criticality in*



$Sr_3Ru_2O_7$ ”

**T. Hanaguri**

The 8th International Conference on Research in High Magnetic Fields, Aug. 16 - 19 2006, Sendai, Japan.

140. “強相関電子系酸化物のSTM/STSによる局所電子状態評価”

**花栗哲郎**

第46回真空に関する連合講演会 2005年11月9日 - 11月11日, 学習院大学.

141. “高温超伝導体におけるチェッカーボード状電荷秩序”

**花栗哲郎**

日本物理学会 2005年秋季大会 2005年9月19日 - 9月22日, 同志社大学.

142. “STM/STS Studies on Strongly Correlated Electron Systems”

**T. Hanaguri**

6th Pacific Rim Conference on Ceramic and Glass Technology, Sept. 11-16, 2005, Maui, USA.

143. “Electronic crystal state in a hole doped cuprate”

**T. Hanaguri,**

2005 APS March Meeting, Mar. 21-25, 2005, Los Angeles, USA.

144. “A 'checkerboard' electronic crystal state in lightly doped cuprate”

**T. Hanaguri,**

The 9th APCTP Winter Workshop on Strongly Correlated Electron Systems, Feb. 15-19, 2005, Phoenix Park, Korea.

145. “STM/STS studies on strongly correlated electron systems”

**T. Hanaguri,**

The 9th APCTP Winter Workshop on Strongly Correlated Electron Systems, Feb. 15-19, 2005, Phoenix Park, Korea.

146. “Evolution of Electronic States and Hidden Order in Lightly Doped  $Ca_{2-x}Na_xCuO_2Cl_2$  - STM/STS study - ”

**T. Hanaguri,**

The 4th International Workshop on Novel Quantum Phenomena in Transition Metal Oxides, Nov. 22-24, 2004, Sendai, Japan.

147. “STM/STS studies on a lightly-doped cuprate  $Ca_{2-x}Na_xCuO_2Cl_2$ ”

**T. Hanaguri,**

Yukawa International Seminar 2004, Nov. 1-4, 2004, Kyoto, Japan.

148. “STM of lightly doped 'calcium' copper oxy-chlorides”

**T. Hanaguri,**

Gordon Research Conference on Superconductivity, Sept. 19-24, 2004, Oxford, UK.

149. “Imaging the Electronic Inhomogeneity in Underdoped Cuprates”

**T. Hanaguri,**

The 11th Japan-US Workshop on High- $T_c$  Superconductors, Oct. 31-Nov. 2, 2003, Shonan, Japan.

150. “Imaging the Electronic Phase Separation in Strongly Correlated Electron Systems by STM/STS”,

**T. Hanaguri,**

1st RIKEN Nanoscience Symposium, May 26-27, 2003, Wako, Japan.

151. *"Spatial variation of the electronic states near the metal to Mott insulator transitions"*,  
**T. Hanaguri** and H. Takagi,  
Workshop on "Phase Competition in Transition-Metal Oxides and Other Compounds", May 14-16, 2003,  
Berkeley, USA.
152. *"Spatial variation of the electronic states near the metal to Mott insulator transitions"*,  
**T. Hanaguri**,  
Fourth International Conference on New Theories, Discoveries, and Applications of Superconductors and  
Related Materials (New<sup>3</sup>SC-4), Jan. 16-21, 2003, San Diego, USA.
153. *"Electronic States of heavily underdoped  $Ca_{2-x}Na_xCuO_2Cl_2$  investigated by STM/STS"*,  
**T. Hanaguri**,  
The 15th International Symposium on Superconductivity (ISS-2002), Nov. 11-13, 2002, Yokohama, Japan.
154. *"Electronic states of vortices in clean s-wave superconductors"*,  
**T. Hanaguri**,  
International Workshop on Quantum Transport in Synthetic Metals & Quantum Functional Semiconductors,  
2001 (QTSM2001), May 9-11, 2001, Seoul, Korea.
155. *"Superfluid response around the vortex phase transition in  $Bi_2Sr_2CaCu_2O_y$ "*,  
**T. Hanaguri**,  
International Workshop on Vortex Physics in High-Temperature Superconductors'99, June 20-25, 1999,  
Stanford, USA.
156. *"Quasi-particle excitation in the mixed state of  $Bi_2Sr_2CaCu_2O_y$ "*,  
**T. Hanaguri**,  
International Workshop on Vortex Physics in High-Temperature Superconductors'98 June 21-26, 1998,  
Hachimantai, Japan.

## **Contributed Oral Presentations at International Conferences**

1. *"Quasiparticle interference and BCS-BEC crossover in FeSe "*,  
**T. Hanaguri**, T. Watashige, S. Kasahara, Y. Yamakawa, H. Kontani, C. Meingast, T. Wolf, H. v. Löhneysen, T. Shibauchi, and Y. Matsuda  
Spectroscopies in Novel Superconductors, June 19-24, 2016, Ludwigsburg, Germany.
2. *"STM/STS Studies of Superconducting Gap in Iron-Based Superconductors"*,  
**T. Hanaguri**, S. Niitaka, K. Kuroki, and H. Takagi  
International Workshop on Novel Superconductors and Super Materials 2011, Mar. 6-8, 2011, Tokyo, Japan.
3. *"Sign-Reversing s-Wave Superconductivity Probed by High-Field STM"*,  
**T. Hanaguri**,  
Joint IMR International Symposium High Magnetic Field Spin Science in 100T VI Application of High Magnetic Field for Condensed Matter and Material Sciences, Dec. 7-9, 2009, Sendai, Japan.
4. *"Magnetic-field Effects on the d-wave Bogoliubov Quasi-Particles and Superconducting Gap in  $Ca_{2-x}Na_xCuO_2Cl_2$ "*,  
**T. Hanaguri**, Y. Kohsaka, M. Ono, J. C. Davis, C. Lupien, I. Yamada, M. Azuma, M. Takano, K. Ohishi, and H. Takagi,  
4th International Symposium on High Magnetic Field Spin Science in 100T, Nov. 26-28, 2007, Sendai, Japan.
5. *"Effects of first-order vortex phase transition on the electronic states of  $Bi_2Sr_2CaCu_2O_y$ "*,  
**T. Hanaguri**, Y. Tsuchiya, K. Iwaya, T. Tsuboi, and A. Maeda,  
Physics and Chemistry of Molecular and Oxide Superconductors '99 (MOS'99), July 28-Aug. 2, 1999, Stockholm, Sweden.
6. *"Josephson plasma resonance in the mixed state of  $Bi_2Sr_2CaCu_2O_y$  containing columnar defects"*,  
**T. Hanaguri**, Y. Tsuchiya, S. Sakamoto, A. Maeda, and D. G. Steel,  
5th International Conference Materials and Mechanisms of Superconductivity High Temperature Superconductors (M2S-HTSC-V), Feb. 28-Mar. 4, 1997, Beijing, China.
7. *"Phase transition in the mixed state of  $Bi_2Sr_2CaCu_2O_y$  observed by local and macroscopic magnetometry"*,  
**T. Hanaguri**, T. Tsuboi, A. Maeda, Y. Kotaka, J. Shimoyama, and K. Kishio,  
21st International Conference on Low Temperature Physics (LT21), Aug. 8-14, 1996, Prague, Czech Republic.
8. *"Phase transition in the vortex system of  $Bi_2Sr_2CaCu_2O_y$  observed by local and macroscopic magnetometry"*,  
**T. Hanaguri**, T. Tsuboi, and A. Maeda  
International Work-Shop on New Physics in the Vortex State of the High Temperature Superconductors (IWPV '96), Apr. 11-13, 1996, Hatoyama, Japan.

## **Seminars and Lectures (official ones only)**

1. “分光イメージング走査型トンネル顕微鏡”,  
**花栗哲郎**  
講義 C, 第 69 回物性若手夏の学校, 2024 年 8 月 2 日 - 8 月 6 日
2. “*Searching for unconventional electronic states by high-resolution spectroscopic-imaging scanning tunneling microscopy*”  
**T. Hanaguri**  
Seminar at “GDR Nanosciences with near-field microscopy under ultra high vacuum” (France), March 28, 2023. (Online)
3. “分光イメージング走査型トンネル顕微鏡”,  
**花栗哲郎**  
集中講義, 東京工業大学物理学系物理学コース, 2022 年 12 月 19 日 - 12 月 22 日
4. “*Toward unambiguous identification of Majorana bound state in the vortex core*”  
**T. Hanaguri**  
2022 IBS CALDES Seminar, Center for Artificial Low Dimensional Electronic Systems, Institute for Basic Science (Korea), Oct. 14, 2022. (Online)
5. “*極限環境分光イメージング走査型トンネル顕微鏡と物質科学*”,  
**花栗哲郎**  
物質系専攻特別セミナーシリーズ「物質科学の新しい潮流」, 東京大学大学院新領域創成科学研究科物質系専攻, 2022 年 8 月 30 日. (Online)
6. “*Spectroscopic-imaging STM on emergent materials*”  
**T. Hanaguri**  
Frontiers of Condensed Matter Physics Lectures, Columbia University, Oct. 8, 2019, New York, USA.
7. “*Search for Majorana zero mode in Fe(Se,Te) using an ultra-low temperature STM*”  
**T. Hanaguri**  
Physics Colloquium, Columbia University, Oct. 7, 2019, New York, USA.
8. “*Zero-energy vortex bound states in the superconducting topological surface state of Fe(Se,Te)*”  
**T. Hanaguri**  
Colloquium at Department of Physics, Tsinghua University, Apr. 11, 2019, Beijing, China.
9. “*Spectroscopic-imaging scanning tunneling microscopy on emergent materials*”  
**T. Hanaguri**  
Max Planck-UBC-UTokyo School, Feb. 15-18, 2018, Tokyo, Japan.
10. “*Spectroscopic-imaging scanning tunneling spectroscopy on unconventional superconductors*”,  
**T. Hanaguri**,  
Physics Department Colloquium, Temple University, March 20, 2017, Philadelphia, USA.
11. “*誰が電子を見たか ～分光イメージング走査型トンネル顕微鏡～*”,  
**花栗哲郎**  
セミナー「物理科学の最前線」, 東北大学大学院理学研究科物理学専攻, 2016 年 11 月 25 日
12. “*Spectroscopic-imaging STM studies of Fe(Se,S)*”,

**T. Hanaguri,**

超導物理与材料研究中心系列報告 17, 南京大学, Oct. 28, 2016, Nanjing, China.

13. “分光イメージング走査型トンネル顕微鏡による電子状態解析”,

**花栗哲郎**

集中講義 (オムニバス), 東京工業大学総合理工学研究科, 2014 年 5 月 21 日

14. “走査型トンネル顕微鏡による電子状態解析”,

**花栗哲郎**

集中講義, 大阪大学理学研究科, 2013 年 10 月 23 日 - 10 月 25 日

15. “STM/STS で見たトポロジカル絶縁体表面の Dirac 電子”,

**花栗哲郎**

物理学科コロキウム, 東邦大学理学部物理学科, 2013 年 1 月 21 日

16. “走査型トンネル顕微鏡を用いた電子状態解析”,

**花栗哲郎**

集中講義, 広島大学先端物質科学研究科, 2012 年 5 月 9 日 - 5 月 11 日

17. “STM/STS で見るトポロジカル絶縁体の磁場中 Dirac 表面電子状態”,

**花栗哲郎**

第 444 回物性セミナー, 広島大学先端物質科学研究科, 2012 年 5 月 9 日

18. “Spectroscopic-imaging STM studies of unconventional superconductors”,

**T. Hanaguri,**

超導物理与材料研究中心系列報告, 南京大学, Aug. 23, 2011, Nanjing, China.

19. “Development of stable STM and its application to a topological insulator”,

**T. Hanaguri,**

超導物理与材料研究中心系列報告, 南京大学, Aug. 23, 2011, Nanjing, China.

20. “STM/STS studies on exotic materials”,

**T. Hanaguri,**

Department of physics seminar series, Boston College, June 10, 2011, Boston, USA.

21. “走査型トンネル顕微鏡を用いた電子状態研究の進展”,

**花栗哲郎**

集中講義, 東京大学総合文化研究科, 2010 年 12 月 20 日 - 12 月 22 日

22. “STM/STS studies of Dirac surface state in a topological insulator”,

**T. Hanaguri,**

CMRI seminar, Seoul National Univ., Oct. 23, 2010, Seoul, Korea.

23. “STM/STS search for unusual electronic states”,

**T. Hanaguri,**

Seminars in condensed-matter physics, Stanford Univ., May. 13, 2010, Stanford, USA.

24. “波数空間プローブとしての STM/STS”,

**花栗哲郎**

物性セミナー, 東京大学総合文化研究科, 2009 年 7 月 3 日

25. “電子状態イメージング STM の開発と高温超伝導体への応用”,

**花栗哲郎**

物性談話会，名古屋大学工学研究科，2008年12月16日

26. “STM で見た高温超伝導体の波数空間電子状態”;

**花栗哲郎**

第111回応用セラミックス研究所講演会，東京工業大学応用セラミックス研究所，2008年2月22日

27. “STM/STS Studies on Strongly Correlated Electron Systems: Search for Electronic Phase Separation Near the Metal-to-Mott-Insulator Transitions”;

**T. Hanaguri,**

LASSP solid state and theory seminars, Cornell Univ., Sept. 16, 2003, Ithaca, USA.

28. “Phase Transition and Dynamics of Vortices in  $Bi_2Sr_2CaCu_2O_y$ ”;

**花栗哲郎**

超電導工学研究所セミナー，超電導工学研究所，1998年1月29日