

# Curriculum Vitae of Shoko Koyama

## Contact address

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## Employment History

- Postdoctoral fellow at ASIAA (April 2017 - present)
- Postdoctoral fellow at Max Planck Institute for Radio Astronomy (April 2014 - March 2017)
- Research student at the University of Tokyo and JAXA/ISAS (October 2013 - March 2014)

## Education

- PhD in Science, the University of Tokyo, Tokyo (September 27, 2013)
- Master of Astronomy, the University of Tokyo, Tokyo (March 2010)
- Bachelor of Science and Engineering, Waseda University, Tokyo (March 2008)

## Honors and Awards

- CTCI Foundation Science and Technology Contribution Award (2019), group award
- Breakthrough Prize in Fundamental Physics (2019), group award

## Teaching Experiences

- Supervising of a graduate student for ASIAA summer student program (two months) with a project “Relativistic Jets in Active Galactic Nuclei” (2019)

## Academic Services

- Scientific Organizing Committee member, Event Horizon Telescope Collaboration meeting, Hilo, Hawaii (December 2019)

## Research Skills

- Reducing and imaging continuum global Radio Interferometry data (GMVA, VLBA, VERA, KaVA, EHT, VLA, ALMA) especially with Very Long Baseline Interferometry (VLBI) at mm-wavelength (43, 86, and 230 GHz) including phase-referencing
- Writing observational proposals and papers

## Research Interests

- Origin of  $\gamma$ -ray emission in AGN
  - Proving the location of blazar radio cores using multi-frequency VLBI astrometry

- Resolving the  $\gamma$ -ray emission region in TeV blazars with EHT+ALMA
- Energetics of Active Galactic Nuclei (AGN) jets
  - Resolving the innermost structure of AGN jets using high-resolution mm-VLBI
  - Kinematics of AGN jets with high-cadence VLBI monitoring
  - Energetics of kiloparsec scale jets in AGNs with Radio (ALMA, VLA), optical, infra-red, X-ray, and  $\gamma$ -ray data

### Approved Proposals (listed PI ones only)

- ALMA
  - EHT+ALMA at 230 GHz, “Resolving the gamma-ray emission region and the jet collimation profile in TeV blazar Mrk 501”, 3.5 hr, 2019.1.01815.V
  - EHT+ALMA at 230 GHz, “Resolving the gamma-ray emission region and the jet collimation profile in TeV blazar Mrk 501”, 3.5 hr, 2018.1.01773.V
  - EHT+ALMA at 230 GHz, “Resolving the gamma-ray emission region and the jet collimation profile in TeV blazar Mrk 501”, 3.5 hr, 2017.1.01724.V
  - observations were not conducted yet
- GMVA
  - GMVA at 86 GHz, “Resolving the jet collimation region in Mrk 501 with the GMVA”, 8 hr, GMVA19A-412 (MK11), observed in 2019 and under analysis
- GLOBAL VLBI
  - global VLBI at 43 GHz, “Probing the inner jet collimation profile of Mrk 501 with global VLBI at 43 GHz”, 24 hr, G15B004 (GK050), observed in 2017 and under analysis
- VLBA
  - VLBA at 43 GHz, “Limits on the position wander of Mrk 501 core at 7 mm”, 24 hr, BK172, publication No. 1-1
- KaVA
  - KaVA at 43 GHz, “Determining the jet structure of Mrk 501 with KaVA 43GHz in 2018 April”, 8 hr, KaVA18A-14
  - KaVA at 22 & 43 GHz, “Quasi-simultaneous dual-frequency monitoring of blazar PKS 1510-089”, 36 hr, KaVA16A
  - KaVA at 22 GHz, “Follow-up of Very High Energy flares of PKS 1510-089”, 36 hr, KAVA15B-14
  - under data analysis
- VERA
  - VERA at 43 GHz, “Limits on the position wander of Mrk 501 core at 7 mm”, 48 hr, publication No. 1-20

## Publication List (2019 November 1st)

*Shoko Koyama*

### 1 Refereed Papers

1. **Koyama, S.**, Kino, M., Doi, A., Niinuma, K., Giroletti, M., Paneque, D., Akiyama, K., Giovannini, G., Zhao, G.-Y., Ros., E., Kataoka, J., Orienti, M., Hada, K., Nagai, H., Isobe, N., Kobayashi, H., Honma, M., & Lico, R., “Stable Radio Core of the Blazar Mrk 501 during High-energy Active State in 2012”, *ApJ*, 884, 2, 2019 [citation: 0]
2. Porth, O., Chatterjee, K., Narayan, R., Gammie, C. F., Mizuno, et al., and Event Horizon Telescope Collaboration, et al., “The Event Horizon General Relativistic Magnetohydrodynamic Code Comparison Project”, *ApJS*, 243, 26, 2019 [citation: 12]
3. Lee, T., Trippe, S., Kino, M., Sohn, B. W., Park, J., Oh, J., Hada, K., Niinuma, K., Ro, H., Jung, T., Zhao, G.-Y., Lee, S.-S., Algaba, J.-C., Akiyama, K., Wajima, K., Sawada-Satoh, S., Tazaki, F., Cho, I., Hodgson, J., Lee, J. A., Hagiwara, Y., Honma, M., **Koyama, S.**, An, T., Cui, Y., Yoo, H., Kawaguchi, N., Roh, D.-G., Oh, S.-J., Yeom, J.-H., et al., “Jet kinematics of the quasar 4C+21.35 from observations with the KaVA very long baseline interferometry array”, *MNRAS*, 486, 2412, 2019 [citation: 0]
4. Event Horizon Telescope Collaboration, et al., “First M87 Event Horizon Telescope Results. VI. The Shadow and Mass of the Central Black Hole”, *ApJ*, 875, L6, 2019 [citation: 82]
5. Event Horizon Telescope Collaboration, et al., “First M87 Event Horizon Telescope Results. V. Physical Origin of the Asymmetric Ring”, *ApJ*, 875, L5, 2019 [citation: 83]
6. Event Horizon Telescope Collaboration, et al., “First M87 Event Horizon Telescope Results. IV. Imaging the Central Supermassive Black Hole”, *ApJ*, 875, L4, 2019 [citation: 61]
7. Event Horizon Telescope Collaboration, et al., “First M87 Event Horizon Telescope Results. III. Data Processing and Calibration”, *ApJ*, 875, L3, 2019 [citation: 46]
8. Event Horizon Telescope Collaboration, et al., “First M87 Event Horizon Telescope Results. II. Array and Instrumentation”, *ApJ*, 875, L2, 2019 [citation: 49]
9. Event Horizon Telescope Collaboration, et al., “First M87 Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole”, *ApJ*, 875, L1, 2019 [citation: 207]
10. Kamali, F., Henkel, C., **Koyama, S.**, Kuo, C. Y., Condon, J. J., Brunthaler, A., Reid, M. J., Greene, J. E., Menten, K. M., Impellizzeri, C. M. V., Braatz, J. A., Litzinger, E., & Kadler, M., “Accretion disk versus jet orientation in H<sub>2</sub>O megamaser galaxies”, *A&A*, 624, A42, 2019 [citation: 2]
11. Doi, A., Kono, Y., Kimura, K., Nakahara, S., Oyama, T., Okada, N., Satou, Y., Yamashita, K., Matsumoto, N., Baba, M., Yasuda, D., Suzuki, S., Hasegawa, Y., Honma, M., Tanaka, H., Ishimura, K., Murata, Y., Shimomukai, R., Tachi, T., Saito, K., Watanabe, N., Bando, N., Kameya, O., Yonekura, Y., Sekido, M., Inoue, Y., Sakamoto, H., Kogiso, N., Shoji, Y., Ogawa, H., Fujisawa, K., Narita, M., Shibai, H., Fuke, H., Uehara, K., & **Koyama, S.**, “A balloon-borne very long baseline interferometry experiment in the stratosphere: Systems design and developments”, *Advances in Space Research*, 63, 779, 2019 [citation: 1]
12. Nakamura, M., Asada, K., Hada, K., Pu, H.-Y., Noble, S., Tseng, C., Toma, K., Kino, M., Nagai, H., Takahashi, K., Algaba, J.-C., Orienti, M., Akiyama, K., Doi, A., Giovannini, G., Giroletti, M., Honma, M., **Koyama, S.**, Lico, R., Niinuma, K., & Tazaki, F., “Parabolic Jets from the Spinning Black Hole in M87”, *ApJ*, 868, 146, 2018 [citation: 20]

13. Hiura, K., Nagai, H., Kino, M., Niinuma, K., Sorai, K., Chida, H., Akiyama, K., D'Ammando, F., Giovannini, G., Giroletti, M., Hada, K., Honma, M., **Koyama, S.**, Orienti, M., Orosz, G., & Sawada-Satoh, S., "VERA monitoring of the radio jet 3C 84 in the period of 2007-2013: Detection of non-linear motion", PASJ, 70, 83, 2018 [citation: 3]
14. Isobe, N., **Koyama, S.**, Kino, M., Wada, T., Nakagawa, T., Matsuhara, H., Niinuma, K., & Tashiro, M., "Mid-infrared Excess from the West Hot Spot of the Radio Galaxy Pictor A Unveiled by WISE ", ApJ, 850, 193, 2017 [citation: 1]
15. Hada, K., Park, J-H., Kino, M., Niinuma, K., Sohn, B-W., Ro, H-W., Jung, T., Algaba, J-C., Zhao, G-Y., Lee, S-S., Akiyama, K., Trippe, S., Wajima, K., Sawada-Satoh, S., Tazaki, F., Cho, I., Hodgson, J., Lee, J-A., Hagiwara, Y., Honma, M., **Koyama, S.**, Oh, J., Lee, T., Yoo, H., Kawaguchi, N., Roh, D-G., Oh, S-J., Yeom, J-H., Jung, D-K., Oh, C., Kim, H-R., Hwang, J-Y., Byun, D-Y., Cho, S-H., Kim, H-G., Kobayashi, H., & Shibata, K. M., "Pilot KaVA monitoring on the M 87 jet: Confirming the inner jet structure and superluminal motions at sub-pc scales ", PASJ, 61, 71, 2017 [citation: 21]
16. Rani, B., Krichbaum, T., Hodgson, J., **Koyama, S.**, Zensus, A., Fuhrmann, L., Marscher, A., & Jorstad, S., "Exploring the Magnetic Field Configuration in BL Lac Using GMVA", Galaxies, 4, 32, 2016 [citation:0]
17. **Koyama, S.**, Kino, M., Giroletti, M., Doi, A., Giovannini, G., Orienti, M., Hada, K., Ros, E., Niinuma, K., Nagai, H., Savolainen, T., Krichbaum T. P., & Perez-Torrez, M. A., "Discovery of off-axis jet structure of TeV Blazar Mrk 501 with mm-VLBI," A&A, 586, 113, 2016 [citation: 6]
18. Sawada-Satoh, S., Akiyama, K., Niinuma, K., Nagai, H., Kino, M., D'Ammando, F., **Koyama, S.**, Hada, K., Orienti, M., Honma, M., & Shibata, K. M., Apparent Inward Motion of the Parsec-Scale Jet in the BL Lac Object OJ287 during the 2011-2012  $\gamma$ -ray Flares, Publication of Korean Astronomical Society, 30, 429, 2015[citation:2]
19. Isobe, N., & **Koyama, S.**, "X-ray measurement of electron and magnetic-field energy densities in the west lobe of the giant radio galaxy 3C 236," PASJ, 67, 77, 2015 [citation: 4]
20. **Koyama, S.**, Kino, M., Doi, A., Niinuma, K., Hada, K., Nagai, H., Honma, M., Akiyama, K., Giroletti, M., Giovannini, G., Orienti, M., Isobe, N., Kataoka, J., Paneque, D., Kobayashi, H., & Asada, K., "Probing Precise Location of Radio Core in TeV Blazar Mrk 501 with VERA at 43 GHz," PASJ, 67, 67, 2015 [citation: 5]
21. Niinuma, K., Kino, M., Doi, A., Hada, K., Nagai, H., and **Koyama, S.**, "Discovery of a Wandering Radio Jet Base after a Large X-Ray Flare in the Blazar Markarian 421," ApJL, 807, 14, 2015 [citation: 6]
22. Niinuma, K., Lee, S. S., Kino, M., Sohn, B. W., Akiyama, K., Zhao, G.-Y., Sawada-Satoh, S., Trippe, S., Hada, K., Jung, T., Hagiwara, Y., Dodson, R., **Koyama, S.**, Honma, M., Nagai, H., Chung, A., Doi, A., Fujisawa, K., Han, M.-H., Kim, J.-S., Lee, J., Lee, J. A., Miyazaki, A., Oyama, T., Sorai, K., Wajima, K., Bae, J., Byun, D.-Y., Cho, S.-H., Choi, Y. K., Chung, H., Chung, M.-H., Han, S.-T., Hirota, T., Hwang, J.-W., Je, D.-H., Jike, T., Jung, D.-K., Jung, J.-S., Kang, J.-H., Kang, J., Kang, Y.-W., Kan-ya, Y., Kanaguchi, M., Kawaguchi, N., Kim, B. G., Kim, H. R., Kim, H.-G., Kim, J., Kim, J., Kim, K.-T., Kim, M., Kobayashi, H., Kono, Y., Kurayama, T., Lee, C., Lee, J.-W., Lee, S. H., Minh, Y. C., Matsumoto, N., Nakagawa, A., Oh, C. S., Oh, S.-J., Park, S.-Y., Roh, D.-G., Sasao, T., Shibata, K. M., Song, M.-G., Tamura, Y., Wi, S.-O., Yeom, J.-H., and Yun, Y. J., "VLBI observations of bright AGN jets with the KVN and VERA Array (KaVA): Evaluation of imaging capability," PASJ, 66, 103, 2014 [citation:26]
23. Hada, K., Giroletti, M., Kino, M., Giovannini, G., D'Ammando, F., Cheung, C. C., Beilicke, M., Nagai, H., Doi, A., Akiyama, K., Honma, M., Niinuma, K., Casadio, C., Orienti, M., Krawczynski, H., G3mez,

- J. L., Sawada-Satoh, S., **Koyama, S.**, Cesarini, A., Nakahara, S., and Gurwell, M. A., “A Strong Radio Brightening at the Jet Base of M 87 during the Elevated Very High Energy Gamma-Ray State in 2012,” *ApJ*, 788, 165, 2014 [citation:38]
24. Doi, A., Murata, Y., Mochizuki, N., Takeuchi, H., Asada, K., Hayashi, T. J., Nagai, H., Shibata, K. M., Oyama, T., Jike, T., Fujisawa, K., Sugiyama, K., Ogawa, H., Kimura, K., Honma, M., Kobayashi, H., and **Koyama, S.**, “Multifrequency VLBI Observations of the Broad Absorption Line Quasar J1020+4320: Recently Restarted Jet Activity?,” *PASJ*, 2013, 65, 57 [citation:6]
25. **Koyama, S.**, Kino, M., Nagai, H., Hada, K., Kamenno, S., and Kobayashi, H., “VLBI Imagings of a Kilo-Parsec Knot in 3C 380,” *PASJ*, 65, 29, 2013 [citation:1]
26. Nagai, H., Kino, M., Niinuma, K., Akiyama, K., Hada, K., **Koyama, S.**, Orienti, M., Hiura, K., Sawada-Satoh, S., Honma, M., Giovannini, G., Giroletti, M., Shibata, K., and Sorai, K., “The GENJI Programme: Gamma-Ray Emitting Notable AGN Monitoring by Japanese VLBI,” *PASJ*, 65, 24, 2013 [citation:18]
27. Orienti, M., **Koyama, S.**, D’Ammando, F., Giroletti, M., Kino, M., Nagai, H., Venturi, T., Dallacasa, D., Giovannini, G., Angelakis, E., Fuhrmann, L., Hovatta, T., Max-Moerbeck, W., Schinzel, F. K., Akiyama, K., Hada, K., Honma, M., Niinuma, K., Gasparrini, D., Krichbaum, T. P., Nestoras, I., Readhead, A. C. S., Richards, J. L., Riquelme, D., Sievers, A., Ungerechts, H., and Zensus, J. A., “Radio and  $\gamma$ -ray follow-up of the exceptionally high-activity state of PKS 1510–089 in 2011,” *MNRAS*, 428, 2418, 2013 [citation:49]
28. Niinuma, K., Kino, M., Nagai, H., Isobe, N., Gabanyi, K. E., Hada, K., **Koyama, S.**, Asada, K., Oyama, T., and Fujisawa, K., “Possible Detection of Apparent Superluminal Inward Motion in Markarian 421 after the Giant X-Ray Flare in 2010 February,” *ApJ*, 759, 84, 2012 [citation:10]
29. Yaji, Y., Tashiro, M. S., Isobe, N., Kino, M., Asada, K., Nagai, H., **Koyama, S.**, and Kusunose, M., “Evidence of Non-thermal X-ray Emission from Radio Lobes of Cygnus A,” *ApJ*, 714, 37, 2010 [citation:16]

## 2 Non-Refereed Papers

1. Sohn, B. W., Giovannini, G., Giroletti, M., Kino, M., Hada, K., Ro, H., Kim, J., **Koyama, S.**, Orienti, M., Honma, M., Nagai, H., Oyama, T., Lico, R., Oh, S., Zhao, G., Cassaro, P., Orfei, A., Stagni, M., Jung, T., Vincente, P., Rioja, M., & Dodson, R., “EATING VLBI and KVN-Yebes observations of AGN jets”, 14th European VLBI Network Symposium & Users Meeting. 8-11 October. Granada, 120, 2018 [citation:0]
2. Kubo, D., Han, C.-C., Nishioka, H., Chilson, R., Srinivasan, R., Yen, S.-F., Fu, K.-C., Jiang, H., Liu, K.-Y., Wei, T.-S., Huang, C.-W., Yu, C.-Y., Oshiro, P., Chang, S.-H., Chen, C.-C., Raffin, P., Huang, Y.-D., Martin-Cocher, P., Chen, M.-T., Inoue, M., Matsushita, S., Asada, K., **Koyama, S.**, Koch, P., Ho, P. T. P., Shaw, Y.-T., Norton, T. J., Patel, N. A., Doeleman, S. S., Bintley, D., et al., “Electronics instrumentation for the Greenland Telescope”, *Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX*, 10708, 1070816, 2018 [citation:1]
3. Bintley, D., Friberg, P., Berthold, R., Chuter, T., Liu, K.-Y., Walther, C., Dempsey, J., Ho, P., McGregor, H., Matsushita, S., Asada, K., **Koyama, S.**, Nishioka, H., Han, C.-C., Huang, C.-W., Lin, L., Wei, T.-S., Kubo, D., Srinivasan, R., Rao, R., Bower, G., Oshiro, P., & Chen, M.-T., “GLT receiver commissioning at JCMT and future JCMT instrumentation”, *Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX*, 10708, 1070815, 2018 [citation:0]
4. Nishioka, H., Huang, C.-W. L., Patel, N. A., Kubo, D., Srinivasan, R., Han, C.-C., Yu, C.-Y., Jiang, H., Lin, L. C.-C., Meyer-Zhao, Z., Martin-Cocher, P., Matsushita, S., Asada, K., Inoue, M., **Koyama, S.**,

- Walther, C., Bintley, D., Liu, K.-Y., Berthold, R., Chuter, T., Friberg, P., Bower, G. C., Chang, S.-H., Chen, M.-T., Dempsey, J., Doeleman, S. S., Huang, Y.-D., Ho, P. T. P., Koay, J.-Y., Koch, P. M., et al., "Control and monitoring system for the Greenland Telescope: computers, network and software", *Ground-based and Airborne Telescopes VII*, 10700, 107005N, 2018 [citation:0]
5. Matsushita, S., Asada, K., Inoue, M., Nishioka, H., Huang, C.-W. L., Patel, N. A., Koay, J. Y., **Koyama, S.**, Koch, P., Meyer-Zhao, Z., Lin, L. C.-C., Ho, P. T. P., Chen, M.-T., Norton, T. J., Liu, K.-Y., Yu, C.-Y., Byun, D.-Y., Algaba Marcos, J.-C., Allardi, A., Bower, G. C., Chang, S.-H., Chen, C.-C., Chilson, R., Faber, A., Han, C.-C., Huang, Y.-D., Jiang, H., Kubo, D., Liu, C.-T., Lo, W.-P., et al., "Commissioning status of the Greenland Telescope (GLT)", *Ground-based and Airborne Telescopes VII*, 10700, 1070029, 2018 [citation:0]
  6. Chen, M.-T., Raffin, P., Ho, P. T. P., Inoue, M., Liu, C.-T., Huang, Y.-D., Han, C.-C., Norton, T. J., Matsushita, S., Asada, K., Nystrom, G., Kubo, D., Patel, N. A., Chang, S.-H., Wei, T.-S., Martin-Cocher, P., Jiang, H., Shaw, P., Nishioka, H., Huang, C.-W. L., Chen, C.-C., Koch, P., Chilson, R., Srinivasan, R., Liu, K.-Y., Yu, C.-Y., Bower, G., Oshiro, P., Snow, W., **Koyama, S.**, et al., "The Greenland telescope: Thule operations", *Ground-based and Airborne Telescopes VII*, 10700, 107000H, 2018 [citation:1]
  7. Asada, K., Kino, M., Honma, M., Hirota, T., Lu, R.-S., Inoue, M., Sohn, B.-W., Shen, Z.-Q., Ho, P. T. P., Akiyama, K., Algaba, J.-C., An, T., Bower, G., Byun, D.-Y., Dodson, R., Doi, A., Edwards, P. G., Fujisawa, K., Gu, M.-F., Hada, K., Hagiwara, Y., Jaroenjittichai, P., Jung, T., Kawashima, T., **Koyama, S.**, Lee, S.-S., Matsushita, S., Nagai, H., Nakamura, M., Niinuma, K., et al., White Paper on East Asian Vision for mm/submm VLBI: Toward Black Hole Astrophysics down to Angular Resolution of 1  $R_S$ , arXiv e-prints, arXiv:1705.04776, 2017 [citation:5]
  8. Zhao, G.-Y., Kino, M., Cho, I.-J., Akiyama, K., Sohn, B. W., Jung, T., Algaba, J. C., Hada, K., Hagiwara, Y., Hodgson, J., Honma, M., Kawaguchi, N., **Koyama, S.**, Lee, J. A., Lee, T., Niinuma, K., Oh, J., Park, J.-H., Ro, H., Sawada-Satoh, S., Tazaki, F., Trippe, S., Wajima, K., & Yoo, H., Millimeter VLBI observations of Sgr A\* with KaVA and KVN, *The Multi-Messenger Astrophysics of the Galactic Centre*, 322, 56, 2017 [citation:3]
  9. **Koyama, S.**, Kino, M., Giroletti, M., Doi, A., Nagai, H., Hada, K., Niinuma, K., Orienti, M., Giovannini, G., Ros, E., Savolainen, T., Pérez-Torres, M. A., & Krichbaum, T. P., "The off-axis jet structure in Mrk 501 at mm-wavelengths", arXiv:1505.04433, 2015 [citation:0]
  10. Yaji, Y., Tashiro, M., Isobe, N., Kino, M., Asada, K., Nagai, H., **Koyama, S.**, & Kusunose, M., "Discovery of non-thermal X-ray emission from radio lobes of Cygnus A", *The Energetic Cosmos: from Suzaku to ASTRO-H*, 34, 2010 [citation:0]