Stanford

Sheikh Rubaiat Ul Haque

Postdoctoral Scholar, Photon Science, SLAC

Bio

BIO

Rubaiat received his undergraduate degree in Applied Physics from the University of Tokyo in 2017. He then moved to the University of California San Diego where he finished his PhD in Physics under Professor Richard Averitt in 2023. During his PhD, he discovered light-induced terahertz parametric amplification and photonic time crystal state in excitonic insulator candidate Ta2NiSe5. He has also demonstrated efficient nonresonant nonlinear magnon generation in a Mott insulating Heisenberg antiferromagnet Sr2IrO4 as well as broadband optical control of plasmonic modes in semiconducting metamaterials.

Currently, Rubaiat is a postdoctoral scholar at Stanford University working on terahertz field-induced ultrafast dynamics in van der Waals magnets under the guidance of Professors Tony Heinz and Aaron Lindenberg. He has shown that intense terahertz pulses can modulate symmetry and drive transitions to a hidden ferrimagnetic state in van der Waals antiferrognet MnPS3. He has recently extended his research to THz spectroscopy of 2D materials. His broader interests also include cavity control and Floquet/Kapitza engineering of quantum materials.

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, American Physical Society (2017 - present)
- Member, Optica (2020 - present)

PROFESSIONAL EDUCATION

- PhD, University of California San Diego , Physics (2023)
- B.E., The University of Tokyo , Applied Physics (2017)

STANFORD ADVISORS

- Tony Heinz, Postdoctoral Faculty Sponsor
- Aaron Lindenberg, Postdoctoral Research Mentor

Publications

PUBLICATIONS

- **Dressing with visible light** *NATURE PHOTONICS*
  Haque, S., Kobayashi, Y.
  2024; 18 (10): 1002-1003
- **Photonic time-crystalline behaviour mediated by phonon squeezing in Ta2NiSe5** *Nature Communications*
  Michael, M. H., Haque, S., Windgaetter, L., Latini, S., Rubio, A., Averitt, R. D., Demler, E.

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- **Terahertz parametric amplification as a reporter of exciton condensate dynamics** *Nature Materials*
  Haque, S., Michael, M. H., Zhu, J., Zhang, Y., Windgaetter, L., Latini, S., Wakefield, J. P., Zhang, G., Zhang, J., Rubio, A., Checkelsky, J. G., Demler, E., Averitt, et al
  2024; 23 (6): 796-802

- **Ultrafast high-harmonic spectroscopy of solids** *Nature Physics*
  Heide, C., Kobayashi, Y., Haque, S., Ghimire, S.
  2024

- **Generalized Fresnel-Floquet equations for driven quantum materials** *PHYSICAL REVIEW B*
  Michael, M. H., Foerst, M., Nicoletti, D., Ul Haque, S., Zhang, Y., Cavalleri, A., Averitt, R. D., Podolsky, D., Demler, E.
  2022; 105 (17)

- **Broadband Terahertz Silicon Membrane Metasurface Absorber** *ACS PHOTONICS*
  Huang, Y., Kaj, K., Chen, C., Yang, Z., Ul Haque, S., Zhang, Y., Zhao, X., Averitt, R. D., Zhang, X.
  2022; 9 (4): 1150-1156

- **Structural tuning of nonlinear terahertz metamaterials using broadside coupled split ring resonators** *AIP ADVANCES*
  Keiser, G. R., Karl, N., Ul Haque, S., Brener, I., Mittleman, D. M., Averitt, R. D.
  2021; 11 (9)

- **On-chip terahertz modulation and emission with integrated graphene junctions** *APPLIED PHYSICS LETTERS*
  Island, J. O., Kissin, P., Schalch, J., Cui, X., Ul Haque, S., Potts, A., Taniguchi, T., Watanabe, K., Averitt, R. D., Young, A. F.
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