Aafaque R. Khan

University of Arizona
Steward Observatory
933 N Cherry Ave
Tucson, AZ 85719 USA

phone: 520-223-5171
arkhan@email.arizona.edu
aafaque.khan@cfa.harvard.edu

AFFILIATIONS AND FELLOWSHIPS

Graduate Student, Steward Observatory, University of Arizona, Tucson, AZ
Pre-doctoral Fellow, Harvard-Smithsonian Center for Astrophysics, Cambridge, MAS
Future Investigators in NASA Earth and Space Science & Technology 2021-2024, NASA Astrophysics, Science Mission Directorate

EDUCATION

Steward Observatory, University of Arizona, Tucson, AZ
Ph.D., Astronomy, 2020-Present, Advisor: Prof. Erika T. Hamden
Research Areas: UV detectors and instrumentation, Galaxy Evolution, CGM
College of Optical Sciences, University of Arizona, Tucson, AZ
M.S, Optical Sciences, 2019-Present
Young India Fellowship, IFRE, New Delhi, India
Post-Graduate Certificate, Liberal studies, 2013-14
Maualana Azad National Institute of Technology (MANIT), Bhopal, India
B. Tech., Mechanical Engineering, 2009-13

WORK EXPERIENCE

Graduate Research Assistant, Hamden UV/Vis Detector Lab, 2019-Present
Steward Observatory, University of Arizona, Tucson, USA
Development of UV/Vis detector calibration facility and cleanroom, Dark current characterization of Electron-multiplying CCDs (EMCCDs), Optical alignment and testing, Straylight analysis, On-board calibration for FIREBall-2 Multi-Object Spectrograph, Aspera Smallsat team member.

Lead Engineer, Solar Ultra-violet Imaging Telescope (SUIT) on Aditya-L1, 2015-2019
Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India
SUIT is a payload on board the Aditya-L1 Spacecraft, designed to study the Sun in the near-ultraviolet region (200-400 nm) from the vantage of the sun-earth Lagrange point (L1). Launched Septemeber: 2022.

CURRENT RESEARCH

1. Aspera SmallSat, (PI: Dr. Carlos Vargas)
Aspera is a 20-million dollar space telescope on a SmallSat, for imaging emission from OVI coronal gas in nearby edge-on galaxies, accepted for 2020 NASA Astrophyics Pioneers Program **($20M)**.
Lead, In-orbit and ground calibration working group.

Member, Science, Mission operations, and Optical design and analysis working groups.

2. Hamden UV/VIS Detector Lab, (HUVD)
Development of Vacuum UV detector characterization facility and cleanroom; Characterizing QE, noise, and dark current for UV optimized EMCCDS for use on future space missions. Dark current of measurement cryocooled EMCCDs in collaboration with Micro-devices Laboratory (MDL) at Jet Propulsion Laboratory (JPL) supported by JPL-Strategic University Partnership grant. PIs: Erika Hamden (UArizona), Shouleh Nikzad (JPL-MDL).

3. Faint Intergalactic Redshifted Emission Balloon (FIREBall-2)
Collaboration: Caltech-JPL, Columbia University, Laboratory of Astrophysics, Marseilles, University of Iowa, NASA, CNES
FIREBall-2 is a balloon borne sub-orbital telescope with a multi-object spectrograph (MOS) designed to measure the faint emission from the Intergalactic Medium. The project is jointly funded by NASA and National Centre for Space Studies (CNES), France.
Optical Alignment and throughput measurement of spectrograph at Laboratory of Astrophysics, Marseille (Summer 2019); Straylight analysis of MOS in Zemax Opticstudio, Optical alignment and implementation of Straylight baffles at Columbia University, New york (2020-22).

PAST RESEARCH

1. Solar Ultra-violet Imaging Telescope (SUIT) on-board Aditya-L1
SUIT is a payload on-board the Aditya-L1 Spacecraft, designed to observe the Sun in the near-ultraviolet region (200-400 nm) from the vantage of the sun-earth Lagrange point (L1).

2. Azad-1 Student Satellite Project
Azad-1 was an undergraduate nanosatellite concept for technology demonstration of an Extreme Ultraviolet Solar Imaging telescope on a nanosatellite platform.

SKILLS

Optical Design: Zemax Opticstudio, Zemax Lens Mechanix, Synopsys Code V, Synopsis Light tools; **Programming:** Python, R, C, MATLAB, Mathematica; **Mechanical Design (CAD) and FEM Software:** Solidworks CAD and Simulation, NX Nastran Structural, Ansys, Autodesk Inventor, Autodesk Mechanical Simulation

AWARDS AND HONORS

1. Jet Propulsion Laboratory Strategic University Partnership Grant (2021)- JPL **(65k$)**
2. Future Investigators in NASA Earth and Space Science and Technology Grant (2021-2024)- NASA **(135k$)**
3. Emerging Space Leaders Grant (2012)- International Astronautical Federation (IAF)

4. Selected Panelist for the Next Generation Plenary at the International Astronautical Congress (2012)- IAF
5. Developing Countries Support Grant (2011)- the IAF and the European Space Agency (ESA)
6. Full tuition scholarship for the B.Tech. (2009-13) at MANIT, Bhopal awarded by Ministry of Minority Affairs, Govt. of India
7. Full tuition scholarship for Young India Fellowship (2013-14) by the International Foundation for Research in Education, New Delhi. (YIF is now at Ashoka University, Sonepat, Haryana)

RELEVANT PUBLICATIONS

1. A. Ghosh, S. Chatterjee, **A. R. Khan**, et al., "The Solar Ultraviolet Imaging Telescope onboard Aditya-L1", in Space Telescopes and Instrumentation 2016: Ultraviolet to Gamma Ray, Proceedings of SPIE Vol. 9905 (SPIE, Bellingham, WA 2016), 990503. (Proceeding)
2. D Tripathi, A. N. Ramaprakash, **A. R. Khan**, et al., "The Solar Ultraviolet Imaging Telescope onboard Aditya-L1", in Special Section: Astronomy, Current Science Vol. 113, No. 11, 10 December 2017. (Article)
3. Keri Hoadley, Erika T. Hamden, Bruno Milliard, **Aafaque R. Khan**, et al., "The FIREBall-2 UV balloon telescope: 2018 flight and improvements for 2020," Proc. SPIE 11118, UV, XRay, and Gamma-Ray Space Instrumentation for Astronomy XXI, 1111815 (9 September 2019). (Proceeding)
4. Haeun Chung, Carlos J. Vargas, Erika Hamden, Tom McMahon, Kerry Gonzales, **Aafaque R. Khan**, Simran Agarwal, et al., "Aspera: the UV SmallSat telescope to detect and map the warm-hot gas phase in nearby galaxy halos" Proc. SPIE, UV/Optical/IR Space Telescopes and Instruments: Innovative Technologies and Concepts X; 1181903 (2021). (Proceeding)
5. Trenton Brendel, Aafaque Khan, et. al., "Balloon-borne FIREBall-2 ultraviolet spectrograph stray light control based on non-sequential reverse modeling of on-sky data," J. Astron. Telesc. Instrum. Syst. 8(4) 048001, 25 November 2022. (Journal Article)
6. S V Manoj Varma, Anurag Tyagi, Bhushan Joshi, Reena Yadav, Pravin Chordia, (et. al. including **Aafaque Khan**), "The Solar Ultraviolet Imaging Telescope: detector characterization and readout electronics testing", RAS Techniques and Instruments, Volume 2, Issue 1, January 2023. (Journal Article)

PUBLICATIONS, submitted, in prep

1. "The Thermal Filter for the Solar Ultraviolet Imaging Telescope (SUIT) on-board Aditya-L1", A. Ghosh, **A. R. Khan**, et. al., SPIE Astronomical Telescopes and Instrurmentation 2022; (Proceeding, Manuscript Submitted)
2. "FIREBall-2(022): challenges, progress, and the road ahead to flight", Keri. Hoadley, et. al., SPIE Astronomical Telescopes and Instrurmentation 2022, (Proceeding, Manuscript Submitted)

3. "Solar Ultraviolet Imaging Telescope (SUIT): Instrument paper", A. N. Ramaprakash,D Tripathi, **A. R. Khan**, et al.
4. "SUIT: On-board Mechanisms", A. Ghosh, A. N. Ramaprakash, D. Tripathi, **A. R. Khan**, et al.
5. "SUIT: Ground Calibration", P. Sreejith, A. N. Ramaprakash, D. Tripathi, **A. R. Khan**, et al.
6. "SUIT: Thermal Design, Analysis and Implementation", Abhijeet A. Adoni, A. N. Ramaprakash, D. Tripathi, **A. R. Khan**, et al.

PROCEEDING PRESENTATIONS

1. "Advanced detector coatings for UV spectroscopy applications", April D. Jewell, John Hennessy, Robin Rodríguez, Erika Hamden, and **Aafaque Khan**, Proc. SPIE UV, X-Ray, and Gamma-Ray Space Instrumentation for Astronomy 2023, (Proceeding)