

## Subramania Athiray Panchapakesan

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CONTACT INFORMATION	Research Scientist Center for Space Plasma and Aeronomic Research University of Alabama Huntsville, AL.	Phone: +1-672-814-5739 E-mail: athray@gmail.com athiray.panchap@nasa.gov
EDUCATION	<b>Ph.D in Physics</b> - University of Calicut Indian Space Research Organization (ISRO) Satellite Centre, Bangalore Indian Institute of Astrophysics (IIA), Bangalore	June 2015
PROFESSIONAL APPOINTMENTS	Thesis Title : Study of lunar surface chemistry using Swept Charge Devices Thesis Advisers : Dr. P. Sreekumar ; Prof. B. R. S. Babu <b>Research Scientist</b> (University of Alabama) <b>NASA Postdoctoral Program</b> (USRA) <b>Postdoctoral Associate</b> (University of Minnesota) <b>Postdoctoral Fellow</b> (Manipal University ) <b>Research Fellow</b> (ISRO/IIA) <b>Research Intern</b> (IIA)	<b>Dec.2021 - Present</b> <b>Mar.2019 - Nov.2021</b> <b>Nov.2016 - Feb.2019</b> <b>Aug.2015 - Oct.2016</b> <b>Jun.2009 - Jun.2015</b> <b>Jun.2007 - Dec.2009</b>
RESEARCH INTERESTS EXPERTISE	<b>Scientific Expertise:</b> Solar flare heating, High-temperature solar coronal diagnostics, Lunar surface chemistry, X-ray fluorescence (XRF) spectroscopic analysis <b>Instrumentation:</b> X-ray instrument testing and calibration (sounding rocket, satellite), X-ray imaging and spectroscopy, Imaging spectrographs, Calculation and verification of radiometric calibration of detectors and instruments, X-ray detector testing (Si/CdTe Strip detectors, X-ray CCDs, Swept Charge Devices) <b>Data analysis and modeling techniques:</b> XRF inversion for elemental abundances, Charge transport model for X-ray CCDs, Methods for photon counting in X-ray images, Inversion of spatial-spectral information from Imaging Spectrographs <b>Service:</b> Co-convenor for the American Geophysical Union Fall meeting (2020,2021); Volunteered as judge for the University of Alabama, Huntsville's program introducing high school students to create space-based mission; Served in the NASA panel (ROSES) to review proposals (2019 - 2021); Referee for the National Academy Science Letters journal, Frontiers in Space and Astronomy.	
MISSIONS AND RESEARCH EXPERIENCE	<b>Marshall Grazing Incidence X-ray Spectrometer (MaGIXS)</b> NASA Sounding rocket mission <ul style="list-style-type: none"><li>• X-ray calibration lead : responsible for end-to-end calibration, data analysis, generation of calibration products</li><li>• Analyze flight data to verify pointing and calibration, generate flight instrument response function, and develop inversion method(s) to unfold <i>MaGIXS</i> data</li><li>• Develop forward models using <i>SDO/AIA</i> and <i>Hinode/XRT</i> data to calculate and verify radiometric predictions</li></ul> <b>Focusing Optics X-ray Solar Imager (FOXSI-3)</b> NASA Solar Sounding rocket mission <ul style="list-style-type: none"><li>• Detector team lead : Calibration of <i>FOXSI</i> hard X-ray detectors using sealed radioactive sources and synchrotron facility</li></ul>	<b>Launch : 2021</b> <b>Launch : 2018</b>

- Support *FOXSI* team in optics calibration at Stray Light Test Facility (SLTF), NASA MSFC
- Combined data from *SDO/AIA*, *Hinode/XRT* and *FOXSI-2*, and produced a well constrained differential emission measure (DEM) of solar microflares

### **Chandrayaan-2 Large Area Soft x-ray Spectrometer(CLASS)**

Indian Moon mission Chandrayaan-2

**Launch : 2019**

- Characterization and ground calibration of X-ray detectors; Collimator design, data rate and operations

### **ASTROSAT - Scanning Sky Monitor (SSM)**

Indian multi-wavelength Astronomy mission

**Launch : 2015**

- X-ray transmission studies of filters - using synchrotron beam

### **Chandrayaan-1 X-ray Spectrometer (C1XS)**

Indian Moon mission Chandrayaan-1

**Launch : 2008**

- Development of X-ray Fluorescence (XRF) inversion algorithm *x2abundance*
- Validation of *x2abundance* using laboratory XRF experiments
- X-ray spectral analysis of C1XS data & determination of lunar abundances

## **FUTURE MISSIONS & ROLES**

### **Marshall Grazing Incidence X-ray Spectrometer (MaGIXS)-2**

NASA Solar Sounding rocket mission

**Expected Launch : 2023**

- Role : Deputy Instrument Scientist
- Status : Under review
- PI : Dr. Amy Winebarger, NASA MSFC

### **CubeSat Imaging X-ray Solar Spectrometer (CubIXSS)**

NASA Cube Satellite Mission

**Expected Launch : 2024**

- Role : Project Scientist
- Status : Funded
- PI : Dr. Amir Caspi, South West Research Institute

## **AWARDS & FELLOWSHIPS**

- National Merit Scholarship, University Grants Commission 2003 - 2005
- DST Research Fellowship 2008 - 2009
- ISRO - IIA Research Fellowship 2009 - 2015
- LPI Career Development Award :  
Lunar & Planetary Institute, NASA, USRA 2014
- K. D. Abhyankar Best Thesis Presentation Award :  
Astronomical Society of India 2016
- NASA Postdoctoral Program : USRA 2019 - 2021

## **EXPERIMENTAL EXPERIENCE**

### **Experiments using advanced facilities**

- XRF on lunar analogs :*Conducted XRF experiments on lunar analog samples using synchrotron X-ray beam at Indus II facility, RRCAT, Indore, India*
- X-ray detector characterization : *Performed first FOXSI X-ray detector (Si/CdTe strip sensors) characterization using the Advanced Light Source, Berkeley*
- X-ray Optics testing : *Performed calibration of grazing incidence X-ray mirrors using the SLTF and X-ray and Cryogenics Facility (XRCF) at NASA MSFC*

TEACHING  
EXPERIENCE

- Graduate course : **Research Methodologies** 2015  
Lectures on data reduction and statistics, assignments and grading  
Organized by : Manipal Centre for Natural Sciences, Manipal University
- Graduate course : **Astronomical Instrumentation (X-rays)** 2011-2013  
Share responsibility for lectures, laboratory, exam, assignments and grades  
Organized by : Indian Institute of Science, (Joint Astronomy Program)
- Undergrad certificate course : **Space and Rocket Dynamics** 2011-2014  
Lectures on planetary system formation, evolution and measurements  
Organized by : ISRO, IIA and St. Joseph's College, Bangalore

HARDWARE &  
SOFTWARE  
SKILLS

Simulation Tools : GEANT4  
Computer Programming : IDL, C, Python  
Data Analysis Packages : XSPEC, OSPEX (Solar soft - SSWIDL), Gnuplot, R  
Operating systems : GNU/Linux, Windows, MacOS

SELECTED  
NON-REFEREED  
PUBLICATIONS

1. Champey, P., Winebarger, A. R., **Athiray, P. S.**, Kobayashi, K., Savage, S., Kolodziejczak, J. K., Davis, J., Griffith, C., Hertz, E. N., Cheimets, P., Ramsey, B., presented at the Optics for EUV, X-Ray, and Gamma-Ray Astronomy IX, vol. 11119, p. 1111917, DOI [10.1117/12.2532397](https://doi.org/10.1117/12.2532397).
2. Musset, S., Buitrago-Casas, J. C., Glesener, L., Bongiorno, S., Courtade, S., **Athiray, P. S.**, Vievering, J., Ishikawa, S.-n., Narukage, N., Furukawa, K., Ryan, D., Dalton, G., Turin, Z., Davis, L., Takahashi, T., Watanabe, S., Mitsuishi, I., Hagino, K., Kawate, T., Turin, P., Christe, S., Ramsey, B., Krucker, S., presented at the UV, X-Ray, and Gamma-Ray Space Instrumentation for Astronomy XXI, vol. 11118, p. 1111812, DOI [10.1117/12.2530029](https://doi.org/10.1117/12.2530029).
3. **Athiray, P. S.**, Buitrago-Casas, J. C., Bergstedt, K., Vievering, J., Musset, S., Ishikawa, S.-n., Glesener, L., Takahashi, T., Watanabe, S., Courtade, S., Christe, S., Krucker, S., Goetz, K., Monson, S., presented at the Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, vol. 10397, 103970A, DOI [10.1117/12.2273915](https://doi.org/10.1117/12.2273915).
4. Buitrago-Casas, J. C., Elsner, R., Glesener, L., Christe, S., Ramsey, B., Courtade, S., Ishikawa, S.-n., Narukage, N., Turin, P., Vievering, J., **Athiray, P. S.**, Musset, S., Krucker, S., presented at the Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, vol. 10399, 103990J, DOI [10.1117/12.2274675](https://doi.org/10.1117/12.2274675).
5. Goswami, A., **Athiray, S. P.**, Karinkuzhi, D., *Astrophysics and Space Science Proceedings*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series **17**, 211–216, DOI [10.1007/978-3-642-10322-3\\_20](https://doi.org/10.1007/978-3-642-10322-3_20) (Jan. 2010).

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PUBLICATIONS

1. **Athiray, P. S.**, Winebarger, A. R., Champey, P., Kobayashi, K., Savage, S., Beabout, B., Beabout, D., Broadway, D., Bruccoleri, A. R., Cheimets, P., Golub, L., Gullikson, E., Haight, H., Heilmann, R. K., Hertz, E., Hogue, W., Johnson, S., Kegley, J., Kolodziejczak, J., Madsen, C., Schattenburg, M. L., Siler, R., Vigil, G. D., Wright, E., *The Astrophysical Journal* **922**, 65, DOI 10.3847/1538-4357/ac2367, (<https://doi.org/10.3847/1538-4357/ac2367>) (Nov. 2021).
2. Pillai, N. S., Narendranath, S., Vadodariya, K., Tadepalli, S. P., Radhakrishna, V., Tyagi, A., Yadav, R., Singh, B., Sharan, V., **Athiray, P. S.**, Sreekumar, P., Sankarasubramanian, K., Bhatt, M., Basu Sarbadhikari, A., Mithun, N. P. S., Vadawale, S., **363**, 114436, DOI 10.1016/j.icarus.2021.114436, (<https://doi.org/10.3847/1538-4357/ac2367>) (July 2021).
3. Vievering, J. T., Glesener, L., **Athiray, P. S.**, Buitrago-Casas, J. C., Musset, S., Ryan, D. F., Ishikawa, S.-n., Duncan, J., Christe, S., Krucker, S., **913**, 15, DOI 10.3847/1538-4357/abf145, (<https://doi.org/10.3847/1538-4357/ac2367>) (May 2021).
4. Vigil, G. D., Winebarger, A., Rachmeler, L., Donders, N., **Athiray, P. S.**, Kobayashi, K., Kankelborg, C., *Journal of Astronomical Telescopes, Instruments, and Systems* **7**, 1–13, DOI 10.1117/1.JATIS.7.3.035009, (<https://doi.org/10.3847/1538-4357/ac2367>) (May 2021).
5. **Athiray, P. S.**, Vievering, J., Glesener, L., Ishikawa, S.-n., Narukage, N., Buitrago-Casas, J. C., Musset, S., Inglis, A., Christe, S., Krucker, S., Ryan, D., **891**, 78, DOI 10.3847/1538-4357/ab7200, (<https://doi.org/10.3847/1538-4357/ac2367>) (Mar. 2020).
6. **Athiray, P. S.**, Winebarger, A. R., Champey, P., Kobayashi, K., Vigil, G. D., Haight, H., Johnson, S., Bethge, C., Rachmeler, L. A., Savage, S., Beabout, B., Beabout, D., Hogue, W., Guillory, A., Siler, R., Wright, E., Kegley, J., **905**, 66, DOI 10.3847/1538-4357/abc268, (<https://doi.org/10.3847/1538-4357/ac2367>) (Dec. 2020).
7. Buitrago-Casas, J. C., Christe, S., Glesener, L., Krucker, S., Ramsey, B., Bongiorno, S., Kilaru, K., **Athiray, P. S.**, Narukage, N., Ishikawa, S., Dalton, G., Courtade, S., Musset, S., Vievering, J., Ryan, D., Bale, S., *Journal of Instrumentation* **15**, P11032, DOI 10.1088/1748-0221/15/11/P11032, (<https://doi.org/10.3847/1538-4357/ac2367>) (Nov. 2020).
8. **Athiray, P. S.**, Winebarger, A. R., Barnes, W. T., Bradshaw, S. J., Savage, S., Warren, H. P., Kobayashi, K., Champey, P., Golub, L., Glesener, L., **884**, 24, DOI 10.3847/1538-4357/ab3eb4, (<https://doi.org/10.3847/1538-4357/ac2367>) (Oct. 2019).
9. Furukawa, K., Buitrago-Casas, J. C., Vievering, J., Hagino, K., Glesener, L., **Athiray, P. S.**, Krucker, S., Watanabe, S., Takeda, S., Ishikawa, S., Musset, S., Christe, S., Takahashi, T., *Nuclear Instruments and Methods in Physics Research A* **924**, 321–326, DOI 10.1016/j.nima.2018.07.011, (<https://doi.org/10.3847/1538-4357/ac2367>) (Apr. 2019).

10. Panini, S. S., Sreekumar, P., Marshall, H. L., Narendranath, S., Nayak, M., **Athiray, P. S.**, *Journal of Astronomical Telescopes, Instruments, and Systems* **4**, 011002, DOI 10.1117/1.JATIS.4.1.011002, (<https://doi.org/10.3847/10.1117/1.JATIS.4.1.011002>) (Jan. 2018).
11. **Athiray, P. S.**, Sreekumar, P., Narendranath, S., Gow, J. P. D., **583**, A97, DOI 10.1051/0004-6361/201526426, (<https://doi.org/10.3847/1538-4357/ac2367>) (Nov. 2015).
12. **Athiray, P. S.**, Narendranath, S., Sreekumar, P., Grande, M., **104**, 279–287, DOI 10.1016/j.pss.2014.10.010, (<https://doi.org/10.3847/1538-4357/ac2367>) (Dec. 2014).
13. Narendranath, S., Sreekumar, P., Alha, L., Sankarasubramanian, K., Huovelin, J., **Athiray, P. S.**, **289**, 1585–1595, DOI 10.1007/s11207-013-0410-9, (<https://doi.org/10.3847/1538-4357/ac2367>) (May 2014).
14. **Athiray, P. S.**, Narendranath, S., Sreekumar, P., Dash, S. K., Babu, B. R. S., **75**, 188–194, DOI 10.1016/j.pss.2012.10.003, (<https://doi.org/10.3847/1538-4357/ac2367>) (Jan. 2013).
15. **Athiray, P. S.**, Sudhakar, M., Tiwari, M. K., Narendranath, S., Lodha, G. S., Deb, S. K., Sreekumar, P., Dash, S. K., **89**, 183–187, DOI 10.1016/j.pss.2013.08.022, (<https://doi.org/10.3847/1538-4357/ac2367>) (Dec. 2013).
16. Weider, S. Z., **60**, 217–228, DOI 10.1016/j.pss.2011.08.014, (<https://doi.org/10.3847/1538-4357/ac2367>) (Jan. 2012).
17. Narendranath, S., **Athiray, P. S.**, Sreekumar, P., Kellett, B. J., Alha, L., Howe, C. J., Joy, K. H., Grande, M., Huovelin, J., Crawford, I. A., Unnikrishnan, U., Lalita, S., Subramaniam, S., Weider, S. Z., Nittler, L. R., Gasnault, O., Rothery, D., Fernandes, V. A., Bhandari, N., Goswami, J. N., Wiczorek, M. A., C1XS Team, **214**, 53–66, DOI 10.1016/j.icarus.2011.04.010, (<https://doi.org/10.3847/1538-4357/ac2367>) (July 2011).