

## Software Engineer for Particle Astrophysics and Cosmology

MSU's Institute for Cyber-Enabled Research and the MSU particle astrophysics and cosmology research group are hiring at least one software engineer to initially work on

- A cloud-based platform to support time-domain transient-source data streams from observatories such as IceCube, LIGO, and the Vera Rubin Observatory
- Data acquisition and reduction for SPT-3G and CMB-S4 experiments

This effort will focus on data produced by several large-scale facilities observing different astronomical messenger particles, including the IceCube Neutrino Observatory, a kilometer-scale neutrino detector at the South Pole, gravitational wave detectors such as LIGO, astronomical survey instruments such as the Vera Rubin Observatory, and cosmic microwave background experiments including SPT-3G and CMB-S4.

The time-domain transient-source data processing will be part of the multi-institution SCiMMA project, and will involve collaboration with developers across multiple universities. SCiMMA is developing a distributed processing system that rapidly coordinates multi-messenger observations of neutrino, gravitational wave, gamma-ray, and optical events between observatories. The data-acquisition and reduction component will be a part of the CMB-S4 and SPT-3G projects and will likewise involve cross-institution collaboration.

Work will involve the development of pub-sub systems for transient event alert distribution and experimental control monitoring, real-time data analysis and visualization tools for data and experiment controls, and data archival solutions. This work will also involve design and development of high-speed networking and software interfaces for non-pub/sub experimental data and distributed processing of the data collected.

**DUTIES AND RESPONSIBILITIES:** In this position you will: design, develop, and deploy high-throughput data acquisition and processing frameworks for CMB-S4. Design, develop, and deploy cloud based services for handling astrophysical multi-messenger alert streams from IceCube, LIGO, Vera Rubin, and other observatories. Implement automated systems for deploying data distribution systems and managing distributed consumers in a cloud and remote experimental environment. Design data storage systems to enable archival and bulk analysis of collected data and alert events. Develop, document, and extend data formats and develop conversion and analysis tools. Architect cloud-hosted JupyterLab data visualization environments to enable end-users to use the developed tools. On-site work is encouraged but remote work is possible.

**QUALIFICATIONS:** Knowledge equivalent to that which normally would be acquired by completing a four year college degree program in Computer Engineering or Computer Science; three to five years of practical experience relating to designing, scheduling, implementing, debugging and testing of complex computer systems; or an equivalent combination of education and experience. Desired qualifications include some subset of: a Bachelor's degree or higher in computer science, physics, astronomy, or a related field; experience with collaborative software

development; expertise in developing and deploying cloud and distributed services; effective written and oral communication skills; experience with Python and C++; an interest in developing expertise in scientific computing software, real-time stream processing, high-throughput computing, distributed databases, and/or front-end web development.

**APPLICATION MATERIALS:** Resume, cover letter, names of three potential references.

**SALARY STATEMENT:** Commensurate with qualifications, anticipated to be \$70K-\$90K.

**APPLICATIONS:** Applications will be reviewed beginning March 9, 2022. Apply to job [#761420](#) at <https://careers.msu.edu/>. Late submissions will be considered if a suitable candidate pool is not identified by the deadline. MSU is an affirmative-action, equal-opportunity employer. MSU is committed to achieving excellence through cultural diversity. The university actively encourages applications and/or nominations of women, persons of color, veterans and persons with disabilities. Applicants who are not U.S. citizens or permanent residents must provide documentation evidencing employment authorization in the United States. Please contact Dr. Nathan Whitehorn at [nwhitehorn@pa.msu.edu](mailto:nwhitehorn@pa.msu.edu) for more information.