

**Postdoctoral Research Position – Deep Learning in  
Heliophysics  
Institute of Astronomy and National Astronomical  
Observatory (IANAO), Bulgarian Academy of Sciences,  
Sofia, Bulgaria**

- 2-year position with a possibility for extension, preferable starting date in May or June 2020; working language is English.
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- The postdoctoral position will focus on development and application of data processing techniques and machine/deep learning models for the characterization and understanding of solar eruptive transients. Specifically, you will process, analyze and model extreme UV (EUV) imaging of coronal mass ejections (CMEs) and shock waves (SDO/AIA, STEREO/EUVI, Proba-2/SWAP instruments), as well as advanced low-frequency radio interferometric observations of thermal and non-thermal CME emission (MWA and LOFAR telescopes).
- 5-year project "Modeling and ObServAtional Integrated Investigations of Coronal Solar Eruptions" (MOSAICS) starting in May 2020, funded by the National Science Fund of Bulgaria; Project PI is Assoc. Prof. Kamen Kozarev;
- The overall goal of the MOSAICS project is to adopt an integrated approach providing a deeper understanding of the plasma processes leading to charged particle acceleration by CMEs near the Sun. The project's high level objectives are to (i) develop and integrate novel image processing and machine learning techniques to reliably analyze radio and EUV remote imaging observations of CMEs and their shocks; (ii) investigate the origins and evolution of radio emission from energetic electron beams in CMEs, comparing with in situ measurements; (iii) develop and apply advanced global data-driven models of particle acceleration and transport to test and improve our theoretical understanding of SEP production and transport. This postdoctoral position will focus on the first objective.
- Recently, the Institute of Astronomy has installed a new 192-core server cluster, and is adding a multi-GPU server node for advanced computations dedicated to

the MOSAICS project. Supercomputer time on BAS-owned and operated systems is also available.

- Requirements: A PhD in astronomy, astrophysics, data science, engineering, or related discipline; demonstrated interest and experience in computational astrophysics/heliophysics, space weather, and machine/deep learning; great writing and communication skills in English;
- Previous experience in scientific programming and visualization, especially in Python (SunPy, Pandas, Numpy, Matplotlib, etc.), Linux/Unix environments, version control (svn, git), machine/deep learning (Torch, Keras, Tensorflow), high-performance or cluster computing, data analysis frameworks, parallel programming and analysis of astronomical data will be considered an advantage.
- Interested candidates should contact Dr. Kamen Kozarev (kkozarev@astro.bas.bg), arrange for three letters of recommendation to be sent to him, and provide a curriculum vitae, a cover letter describing their experience and interests, and a list of relevant publications.
- A very competitive salary of approximately €1700/month (pre-tax) is offered. (Average salary in Bulgaria is €600/month, pre-tax). Separate travel funding for meetings will be provided as well. Representative numbers for the local cost of living can be found at <https://bit.ly/2TRohMp>;
- The Institute of Astronomy is a leader in astrophysical research in Bulgaria and Southeast Europe. It hosts over 80 researchers working in several areas of astrophysics, namely solar activity and solar system small bodies, stars and stellar systems, galaxies and cosmology. Additionally, IANAO staff have strong expertise in operating and maintaining the National Observatory Rozhen - a dedicated facility in the Rhodopi mountains with a flagship 2-meter reflective optical telescope, as well as a number of smaller research-grade telescopes. For more information, visit <http://astro.bas.bg>.