At the Institute for Theoretical Astrophysics of Heidelberg University a position (full time) as

Postdoctoral Researcher (f/m/d)

will be available from 01.01.2026.

The position is part of the new research group StarForML that is led by Dr. Victor Ksoll and funded via the Nexus program of the Carl-Zeiss-Stiftung. ITA is embedded in the Center for Astronomy of Heidelberg University, which also includes the Astronomisches Rechen-Institut (ARI) and the Landessternwarte Königsstuhl (LSW). With several other institutes, such as the Max Planck Institute for Astronomy (MPIA), the Max Planck Institute for Nuclear Physics (MPIK), the Heidelberg Institute for Theoretical Studies (HITS), the Institute for Theoretical Physics (ITP), and the Interdisciplinary Center for Scientific Computing (IWR) engaging in astronomical research, Heidelberg is one of the largest hubs for Astronomy in Germany.

The StarForML group focuses on developing robust machine learning tools for the evaluation of star formation observations. We aim to gain new insights into how star formation progresses across star-forming regions and how the stellar feedback of young stars interacts with the ISM in their natal environments. To tackle these scientific questions, we utilize simulations of stellar evolution, stellar atmospheres and star-forming environments to train deep learning approaches (i.e. invertible neural networks) to solve inverse problems such as deriving stellar astrophysical parameters from photometric (e.g. Gaia or HST) and spectroscopic observations, or reconstructing the distribution of interstellar dust in star-forming regions from dust emission maps (with Spitzer, Herschel etc.). In addition, we focus on understanding the decision-making process of the developed ML tools and devising new strategies to bridge potential gaps between the astrophysical simulations and real observed data (using e.g. transfer learning techniques).

Your job:
The primary goal of the project you are going to lead is the development of an invertible neural network tool for the purpose of deriving stellar properties (such as age, mass, metallicity) from photometric (and spectroscopic) observations. This will include:
- Curating training data from stellar evolution simulations and generating synthetic observations.
- Development of robust, simulation-based inference tools for the purpose of characterizing (young) stars.
- Application of the developed tools to survey data of (large) star-forming regions to derive detailed star-formation histories.
- Cooperation with international collaboration partners and large research consortia.
- Documentation of software and data according to the FAIR data principles.
- Publication of results in collaboration meetings, workshops, international conferences and peer-reviewed journals.
- Contributions to workshops and training activities.
- Mentoring of PhD, Master and undergraduate students.

Your profile:
- Keen interest in developing simulation-based machine learning tools for the evaluation of observational data and studying star formation, stellar feedback and the interplay between young stars and the ISM in their natal environments.
- PhD degree in astronomy, physics, computer science or equivalent fields of study.
- Expertise in theoretical star formation and stellar evolution.
- Experience with analyzing photometric and spectroscopic observations of stars.
- Experience with basic/advanced machine learning concepts and workflows, normalizing flow architectures, as well as standard machine learning libraries (e.g. PyTorch) would be considered an asset.
- Programming experience in Python.
- Ability to work in a team.
- Self-driven, independent, and goal-oriented work ethic.
- Good command of written and spoken English.

We offer:
- Comprehensive courses, language courses, mentoring and career-planning support via Heidelberg University to advance your career and strengthen your profile.
- An extensive astronomical research community to learn from, become part of and contribute to.
- Close collaboration in a small team, as well as with several international collaboration partners.
- Possibilities to pursue own research projects that align with the focus of the group.
- A yearly travel allowance to participate in international conferences and workshops.

- Access to local computing resources, as well as state-side HPC facilities.
- 30 days of annual leave.
- Job ticket (valid for public transport across all of Germany), Flexible work hours and options for regular home office.

The position is available from 01.01.2026 for a fixed term of 5 years (3 years + 2 year extension). Remuneration is based on the German wage agreement for the public service (TV-L, E13).

Applicants are requested to submit a cover letter, a short summary of research experience and interests (max. 3 pages), curriculum vitae including a list of all publications, copy of PhD certificate, and one letter of recommendation.

All documents are to be submitted electronically in a single PDF file (please do not exceed 10MB) via email with the subject "StarForML Application" to v.ksoll@uni-heidelberg.de by **October 24th**.

Heidelberg University stands for equal opportunities and diversity. Qualified female candidates are especially invited to apply. Persons with severe disabilities will be given preference if they are equally qualified. Information on job advertisements and the collection of personal data is available at www.uni-heidelberg.de/en/job-market.