# Curriculum Vitae — Artur Avakyan

## Personal Info

**Name:** Artur Avakyan
**Current position:** Post-Doctoral researcher in Tuebingen University
**Address:** Tübingen, Baden-Württemberg (open to relocation/hybrid)
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**Web:** Portfolio, XRBCats, : ScorpionesXone

## Professional Summary

Astrophysicist and Software Developer with 5+ years of experience in building complex data pipelines, machine learning models, and high-performance physical engines. Passionate about transitioning from academia to permanent infrastructure development, translating complex astrophysical data into user-friendly web portals and robust backend architectures. Proven ability to lead technical sub-projects within large international collaborations (eROSITA) and deliver tools that serve the global scientific community.

## Technical Skills

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|---|---|
| *Programming* | Python, C/C++, SQL/ADQL, JavaScript, HTML/CSS |
| *Data Science* | Machine Learning, Statistical Modeling, Nested Sampling |
| *Scientific Computing* | NumPy, SciPy, pandas, astropy, XSPEC, pyphot, astroARIADNE |
| *Software Engineering* | FastAPI, REST APIs, Git, CI/CD, Docker, Testing |
| *Data Engineering* | Data Pipelines + Processing + Validation, FITS, Automated Workflows |
| *Scientific Domain* | Statistical Inference, MWL Data Analysis, SED Modeling |

## Work Experience

**Scientific Developer / Post- & Doctroral researcher** **2021 — Present**
Institute for Astronomy and Astrophysics, University of Tübingen, Germany

- **Data Portals & Architecture:** Architected and deployed XRBcats, a comprehensive, standardized relational database and public web portal for Galactic X-ray binaries, providing data access to the global community.
- **Machine Learning & Big Data Pipelines:** Designed and implemented supervised ML pipelines to process, cross-match, and classify millions of sources.
- **Technical Leadership:** Mentored and supervised students in Python development, data analysis, and code optimization.
- **Advanced Computational Modeling:** Expert in Spectral Energy Distribution (SED) fitting and photometric analysis. Applied Bayesian inference and nested sampling algorithms to complex models.

**Software Engineer / Researcher** **2018 — 2021**
Sternberg Astronomical Institute, Moscow State University, Russia

- **High-Performance Computing:** Co-developer of `FREDDI`, an open-source C++ physical engine for modeling accretion disc dynamics.
- **Numerical Algorithms:** Implemented implicit finite-difference schemes and tridiagonal matrix algorithms to efficiently solve complex non-linear diffusion equations.

## Key Software Products & Portfolio

- **XRBcats: Science User Web Portal**
  A full-stack project providing a unified catalogue of High- and Low-Mass X-ray Binaries. Used by researchers globally.
- **Interactive 3D Galaxy Visualization**
  Developed an interactive, browser-based 3D visualization for sources in the Galaxy
- **FREDDI (C++ Physical Engine)**
  Co-authored a fast-rise exponential-decay accretion disc model implementation. Highly optimized C++ code for numerical simulations in astrophysics.

## Education

**Ph.D. in Astrophysics** **2021—2025**
*Place:* Institut für Astronomie und Astrophysik Tübingen, Universität Tübingen, Germany
*Focus:* Machine Learning on Big Data, X-ray binary populations, eROSITA survey.
*Advisors:* Dr. Victor Doroshenko and Prof. Dr. Andrea Santangelo

**Master in physics and astronomy** **2015—2021**
*Place:* Sternberg Astronomical Institute, Moscow State University, Russian Federation
*Focus:* Numerical simulations, accretion disc modelling
*Advisors:* Dr. Galina Lipunova and Dr. Konstantin Malanchev

## Personal Skills

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|---|---|
| *Languages* | English (C1+, including professional vocabulary)<br>Russian (native)<br>German (B1+) |
| *Astronomy soft* | XSPEC, TOPCAT, proficiency databases such as Vizier/SIMBAD/MAST |
| *Software* | Microsoft Office (Word, Excel), GitHUb, LaTeX |

## Service

**Member** of eROSITA_DE consortium (accreting compact objects and follow-up working groups)
**Reviewer** in Monthly Notices of the Royal Astronomical Society journal
**Reviewer** in Journal of High Energy Astrophysics (JHEAP)

## Selected Publications

*Highlighting papers focused on software products, data engineering, and machine learning pipelines. Full list of publications available on ORCID.*

- **Avakyan A.**, Zainab A., Doroshenko V., et al. (upcoming, 2026). *"Hunting down new Galactic XRBs in eROSITA using ML"*.
  **Tech Focus:** Automated classification of millions of X-ray sources using ML on MWL Big Data.
- **Avakyan A.**, Neumann M., Zainab A., Doroshenko V., et al. (2023). *"XRBcats: Galactic Low-Mass X-ray binary catalogue"*. A&A, 675, A199.
  **Tech Focus:** Relational database architecture, data standardization, and public web portal development.
- **Avakyan A.**, Lipunova, G., & Malanchev, K. (2024). *"The effect of thermal winds on the outbursts evolution of LMXB systems"*. MNRAS, 527, 3709.
  **Tech Focus:** High-performance C++ numerical simulations and algorithm optimization (FREDDI engine).

## References


- Prof. Dr. Andrea Santangelo (santangelo@astro.uni-tuebingen.de, IAAT, Tübingen, Germany)
- Dr. Victor Doroshenko (victor.doroshenko@gmail.com, Omegalambdatec, Garching, Germany)
- Dr. Galina Lipunova (glipunova@mpifr-bonn.mpg.de, MPIFR, Bonn, Germany)
- Dr. Konstantin Malanchev (malanchev@cmu.edu, CMU, Pittsburgh, USA)