Dr. Valeri Hambaryan

Curriculum Vitae

Personal Information

Births **07th January 1958**, *v. Satkha, Republic of Georgia*.

Marital Status **Married, have two daughters**.

Experience

Vocational

since 2018 **Scientific Researcher**, *Astrophysikalisches Institut und Universitäts Sternwrte Jena*, Germany.
Performing studies of High-velocity and Runaway stars based on the data of Gaia mission

2017 **Out of engagement**.

2007–2016 **Scientific Researcher**, *Astrophysikalisches Institut und Universitäts Sternwrte Jena*, Germany.
Performed studies of isolated neutron stars in the project SFB/Transregio 7 - Gravitational Wave Astronomy:
- Project C7 - Populations of Astrophysical Sources
  - Phase-resolved spectroscopic study of the isolated neutron star RBS 1223
  - The compactness of the isolated neutron star RX J0720.4–3125
- Project B9 - Gravitational Waves from Magnetar Seismology
  - Bayesian timing analysis of giant flare of SGR 1806–20
- A Galactic short gamma-ray burst as cause for the ^{14}C peak in AD 774/5

2002–2007 **Scientific Researcher**, *Astrophysikalisches Institut Potsdam, Germany*.
The development of science analysis software for XMM-Newton
- Developing the XMM-Newton X-ray source detection software (algorithm and implementation)

1999–2002 **Scientific Researcher**, *Astrophysikalisches Institut Potsdam, Germany* .
Performed studies of Isolated Neutron Stars and Polars
- Discovery of 5.16 s pulsations from the isolated neutron star RBS 1223

1998–1999 **Scientific Researcher**, *Max-Planck Institut für Extraterrestrische Physik*, Garching bei München, Germany .

1996–1998 **Senior Scientific Researcher**, *Byurakan Astrophysical Observatory*, Armenia.

1993–1996 **Scientific Researcher**, *Byurakan Astrophysical Observatory*, Armenia.

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1981–1993 **Junior Scientific Researcher**, *Byurakan Astrophysical Observatory*, Armenia.

1979–1981 **Senior Laboratory Assistant**, *Byurakan Astrophysical Observatory*, Armenia.

Teaching

2014–2016 **Also lecturer at Friedrich−Schiller−Universität Jena**, *Computational Astrophysics,Astrostatistics,Neutron Stars*.

1996–1998 **Also lecturer at Yerevan State University**, *Non-stationary phenomena in stars*.

Publications

1981–2017 Number of publications in referred journals: 104 out of 147.

- SAO/NASA Astrophysics Data System: http://adsabs.harvard.edu/
- or Google Scholar: https://scholar.google.de/
- Our most recent paper has been selected as Highlight publication in international Journal Astronomy & Astrophysics: https://www.aanda.org/2017-highlights/1368

Education

1984–1988 **Post–graduate courses in Astronomy and Astrophysics**, *Byurakan Astrophysical Observatory*, Armenian Academy of Sciences, Armenia.

1974–1979 **Master of Science in Physics**, *State University of Yerevan*, Armenia.

1971–1974 **Secondary Physical and Mathematical Special School**, *State University of Yerevan*, Armenia.

1964–1971 **Secondary School**, *v. Satkha, Repulic of Georgia*.

Diplomas

1979 **Master of Science in Physics**.

1992 **Candidate of Physical and Mathematical Sciences, i.e. PhD** .

since 1994 **Member of International Astronomical Union** .

Master Thesis

Title *On the inverse Compton effect of flare phenomenon*

Description In this thesis I have investigated the theory of inverse Compton effect of stellar flares, where the flare phenomenon is explained by assuming that fast electrons appear spontaneously above the atmosphere, which then interacts with infrared photons to produce an optical flare by the inverse Compton effect.

PhD Thesis

Title *Optical study of red dwarf stars*

Description My PhD thesis devoted to the photometric, spectral, and statistical study of red dwarf (flare and T Tauri type) stars in the Solar neighborhood and stellar clusters and associations.

Research Interests

- Physics and evolution of stars
- Regions of Star Formation
- Neutron Stars
- T Tau Type Stars
- Supernovae
- Spectroscopy
- Timing analysis
- Solar activity
- Galactic Structure
- Gamma–ray bursts
- Flare Stars
- SNR
- Photometry
- Image processing
- Historical variations of radiocarbon (^{14}C) and other isotopes (^{10}Be,^{36}Cl)

Computer skills

Operational Systems UNIX, Microsoft Windows, Mac

Programming Languages

- HTML, LaTeX, OpenOffice, Microsoft Office
- SHELL scripting, AWK, SED
- FORTRAN, C, C++, PYTHON
- R, SAS, idl, Matlab, Mathematica, SPSS

Statistical analysis

Multidimensional data

- Classical statistics and Bayesian Inference
  - Model comparision and Hypothesis testing
  - Parameter estimation
- Markov Chain Monte Carlo (MCMC) algorithms
- Pattern recognition and classification
- Principal component, cluster, factor, discriminant analysis

Languages

Armenian	**Mothertongue**	
English	**Advanced**	*Fluent conversation and writing*
Russian	**Advanced**	*Fluent conversation and writing*
German	**Intermediate**	*Conversationally fluent*

Communication Skills

Oral presentations and posters at the many International Conferences

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Research Interests:

Previous research:

In my master thesis I have investigated the theory of inverse compton effect of stellar flares. In this theory, the optical flare phenomenon is explained by assuming that fast electrons (with the energy of 1-2 Mev) appear spontaneously above the atmosphere as a result of some kind of process, which then interacts with infrared photons to produce an optical flare by the inverse Compton effect.
My phd thesis devoted to the photometric, spectral, and statistical study of red dwarf (flare and T Tauri type) stars in the Solar neighborhood and stellar clusters and associations.
Since the end of 1990-ies, my research focused on the study of variability phenomena of low-mass stars in X-rays. Using a Bayesian change point detection method, we analyzed the ROSAT All-Sky Survey (RASS) Bright Source Catalog (BSC) (18811 sources) for variability. The method works on unbinned data, i.e. the photon arrival times of RASS event tables. In total 642 sources were found to be variable, 249 of them were optically identified within RBS-program (ROSAT Bright Survey). This approach allowed also to discover and investigate a very low-mass star in the solar neighborhood, originally identified as an optical counterpart of a flaring X-ray source detected during ROSAT All-Sky survey. I have analyzed our VLT and XMM-Newton observation of 1RXS J115928.5−524717, an ultracool dwarf with spectral type M9 and compare its optical and X-ray properties to those of other similar very late-type stars.

Current Research:

My current research interests stem from my desire to understand fundamental problem of contemporary physics and astrophysics; The equation of state (EOS) of matter at ultra-high densities, such as neutron stars (NS), i.e. constraints on the compactness of isolated NSs by observations and theoretical modeling.
To constrain the EOS from NS observations, one has to measure, e.g., their mass, radius, and rotation period with sufficient precision. This can be done, e.g., with X-ray observations of X-ray bright, thermally emitting isolated NSs with extremely high magnetic field (B $>10^{13-14}$ G): Anomalous X-ray pulsars and Soft Gamma-ray Repeaters (magnetars).
Our most recent paper has been selected as Highlight publication in Astronomy & Astrophysics: https://www.aanda.org/2017-highlights/1368

Title ***Identifying birth places of the high-velocity stars***

The goal of the project is to search, detection, study and identifying birth places of high-velocity stars with Gaia mission.
An offshoot of my research is to study of the G-type stellar population showing superflares with Kepler mission. It was motivated with the strong ^{14}C variation in AD 774/5 in tree rings, caused either a solar super-flare or a short gamma-ray burst (suggested by us).