

# Volodymyr S. Akhmetov

## PERSONAL DATA

**Date of Birth:** July 22, 1984

**Place of Birth:** Kharkiv region, Ukraine;

**Nationality:** Ukrainian

**Marital status:** Married, sons (19.12.2011, 1.07.2020) and daughter (12.04.2013).

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## SAO/NASA ADS

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## EDUCATION:

**2012 - Ph. D.** (Ukrainian - Candidate of Sciences) in Astrometry and Celestial Mechanics. Main Astronomical Observatory of Ukrainian National Academy of Science, Kyiv, Ukraine. The title of the work is “The kinematics parameters of the Galaxy using data of modern astrometric catalogues”. This work is devoted to investigation of the Galaxy kinematics parameters by means data of the Tycho2, UCAC3, PPMXL and XPM catalogues. The first part is focused on creation of the XPM catalogue and study of systematic errors that may affect the determination of kinematics parameters. The second part of the work presents the results of determining the kinematics parameters of the galaxy obtained using the Ogorodnikov-Milne's model. *Supervisor: Dr. P.N. Fedorov.*

**2006 - Masters Degree** in Astronomy, Kharkiv National University, Kharkiv, Ukraine (diploma with honours). The graduate thesis “Research kinematics parameters of the Galaxy using stars proper motions of XC1 catalogue” has been carried out in the Laboratory of Astrometry of the Institute of Astronomy of Kharkiv National University and was awarded with “excellent” grade. *Supervisor: Dr. P.N. Fedorov.*

## POSITIONS:

<b>2019 – present</b>	Deputy Director, Institute of Astronomy of Kharkiv National University, Kharkiv, Ukraine.
<b>2019 – 2021</b>	C/C++ developer/Data Scientist, Science Department of EOS Data Analytics, Kharkiv, Ukraine.
<b>2018 – present</b>	Leading Research Scientist, Institute of Astronomy of Kharkiv National University, Kharkiv, Ukraine.
<b>2014 – present</b>	Associated professor, Astronomy and Space Informatics Department of Kharkiv National University, Kharkiv, Ukraine.
<b>2015 – 2017</b>	Senior Research Scientist, Institute of Astronomy of Kharkiv National University, Kharkiv, Ukraine.
<b>2013 – 2016</b>	Research Scientist, Radio Astronomy Institute of National Academy of Sciences of Ukraine, Kharkiv, Ukraine.
<b>2014 – 2015</b>	Research Scientist, Institute of Astronomy of Kharkiv National University, Kharkiv, Ukraine.

<b>2009 – 2013</b>	Junior Research Scientist, Institute of Astronomy of Kharkiv National University, Kharkiv, Ukraine.
<b>2006 – 2009</b>	Ph. D. student, Institute of Astronomy of Kharkiv National University, Kharkiv, Ukraine.

**RESEARCH INTERESTS:** Large astronomical surveys; Astrometry reduction; Image analysis and processing; Analysis of astrometric catalogues; Reference Systems; Kinematics, structure and evolution of Galaxy; Object classification; Computer processing and analysis big-data.

### **WORK EXPERIENCE:**

Ground-based observations;  
 Preparation, validation and reduction of observations;  
 Creating and analysis of catalogues of stellar positions and proper motions;  
 Research into kinematic parameters of the Galaxy by means of tangential and space velocities of stars in frameworks of modern physical and mathematical models;  
 Solving the problem of celestial objects separation to stars and extragalactic sources using astrometric and photometric data;  
 Applying machine learning and statistical data analysis methods for classification of objects contained in modern astronomical catalogues;  
 Search and study of Globular Clusters, Open Clusters and Dwarf galaxies in large astrometric catalogues.

### **PROGRAMMING SKILLS:**

Software development (Linux & Windows) C/C++ advanced knowledge;  
 Bash, AWK, SED, Gnuplot, Octave scripting - good knowledge;  
 Databases (PostgreSQL, MSSQL) – extensive experience;  
 Python, FORTRAN, PHP - good knowledge;  
 Fair knowledge of document development software (LaTex, Word, ...).

### **TEACHING ACTIVITIES:**

Lecture and practical courses for graduate and postgraduate students:

*Winter semesters:* Image analysis and processing in astronomy (since 2018);  
 Using C/C++ for Big Data and Data Science (since 2021);  
*Summer semesters:* Programming in C/C++ (since 2014);  
 Mathematical Modeling and Numerical Methods (since 2015).

### **SUPERVISION EXPERIENCE:**

Supervision of several undergraduate (bachelor and master level) research projects on the topic of the kinematics studies of Galaxy; the mathematics methods of astronomical images processing; machine learning and statistical data analysis methods for objects classification etc.

### **PROFESSIONAL SOCIETIES:**

Member of the International Astronomical Union (IAU).  
 Member of the European Astronomical Union (ESA).  
 Reviewer for papers on Monthly Notices of the Royal Astronomical Society.  
 Reviewer for young scientist research projects at Ministry of Education and Science of Ukraine.

### **HONORS AND AWARDS:**

- 2011- 2012 Scholarship from the Association of V. N. Karazin Kharkiv National University Alumni, Faculty and Friends for young scientists.
- 2014-2015 Scholarship from the Department of Education and Science of the Kharkov Region Government for young scientists.
- 2015 Scholarship from the Ukrainian Astronomical Association for young scientists.

**GRANTS:**

- 2009-2010 Grant of Joint Russian-Ukrainian fundamental research project.
- 2017-2020 Header of young scientist research project of grant Ministry of Education and Science of Ukraine
- 2020-2022 NRFU Competition "Leading and Young Scientists Research Support"  
Astrophysical Relativistic Galactic Objects (ARGO): life cycle of active nucleus.

**LANGUAGES:** Ukraine and Russian (Native Speaker); English (Intermediate).

**ADDITIONAL INFORMATION:**

Driving license «B», «C» categories;

Personal characteristics: purposeful, hardworking, responsible, work well in a team and individually.

Hobbies: bicycle, music, team sports.

**REFERENCES**

- Professor, Peter Fedorov: Kharkiv National University, [pnfedorov@gmail.com](mailto:pnfedorov@gmail.com);  
Professor, Valerii. Shulga: Institute of Radio Astronomy NAS, [shulga@rian.kharkov.ua](mailto:shulga@rian.kharkov.ua);  
Professor, Yuriy G. Shkuratov: Kharkiv National University, [shkuratov@astron.kharkov.ua](mailto:shkuratov@astron.kharkov.ua).

## СПИСОК ПУБЛІКАЦІЙ/ LIST OF PUBLICATIONS

1. P.N. Fedorov, **V.S. Akhmetov**, A.B. Velichko, A.M. Dmytrenko, S.I. Denischenko Kinematics of the Milky Way from the Gaia EDR3 red giants and sub-giants // Monthly Notices of the Royal Astronomical Society, <https://doi.org/10.1093/mnras/stab2821>
2. **V S Akhmetov**, P N Fedorov, V S Tsvetkova, E Yu Bannikova Analysis of modern astrometric catalogues in the Gaia era // Monthly Notices of the Royal Astronomical Society, Volume 505, Issue 3, August 2021, Pages 3219–3227, <https://doi.org/10.1093/mnras/stab1602>
3. E.Yu. Bannikova, A.V. Sergeyev, N.A. Akerman, P.P. Berczik, M.V. Ishchenko, M. Capaccioli, **V.S. Akhmetov** Dynamical model of an obscuring clumpy torus in AGNs: I. Velocity and velocity dispersion maps for interpretation of ALMA observations // Monthly Notices of the Royal Astronomical Society, Volume 503, Issue 1, May 2021, Pages 1459–1472, <https://doi.org/10.1093/mnras/stab468>
4. Velichko, A.B., Fedorov, P.N., **Akhmetov, V.S.** / Kinematics of main-sequence stars from the Gaia DR2 and PMA proper motions // Mon. Notic. Roy. Astron. Soc. – 2020. –Vol. 494, Iss. 1. –P. 1430-1447. <https://doi.org/10.1093/mnras/staa825>
5. **V. Akhmetov**, S. Khlamov, V. Khramtsov, A. Dmytrenko / Astrometric reduction of the wide-field images // Advances in Intelligent Systems and Computing Springer Nature Switzerland. – 2020. – Vol. 1080. – P. 896–909. [DOI: 10.1007/978-3-030-33695-0\\_58](#). Chapter of Book Series
6. V. Savanevych, **V. Akhmetov**, S. Khlamov, E. Dikov, A. Briukhovetskyi, V. Vlasenko, V. Khramtsov, Ia. Movsesian / Selection of the reference stars for astrometric reduction of CCD-frames // Advances in Intelligent Systems and Computing IV: Springer Nature Switzerland. – 2020. – Vol. 1080. – P. 881–895. [DOI: 10.1007/978-3-030-33695-0\\_57](#). Chapter of Book Series
7. **V. Akhmetov**, S. Khlamov, V. Savanevych, E. Dikov / Cloud computing analysis of Indian ASAT test on March 27, 2019 // IEEE International Scientific and Practical Conference "Problems of Infocommunications. Science and Technology" (PIC S&T'2019). – 2019. – P. 315-318. DOI: 10.1109/PICST47496.2019.9061243
8. **V. Akhmetov**, S. Khlamov, A. Dmytrenko V. Khramtsov / New algorithm for astrometric reduction of the wide-field images // IEEE 14th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT). – 2019. –106-109p. [DOI: 10.1109/STC-CSIT.2019.8929781](#)
9. V. Savanevych, E. Dikov, A. Briukhovetskyi, V. Vlasenko, **V. Akhmetov**, S. Khlamov, V. Khramtsov, Ia. Movsesian / New approach to select reference stars for astrometric reduction of CCD-frames // IEEE 14th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT). – 2019. – 110-113 p. [DOI: 10.1109/STC-CSIT.2019.8929862](#)
10. **V. Akhmetov**, S. Khlamov, I. Tabakova, W. Hernandez, J. I. N. Hipolito, P. Fedorov / New approach for pixelization of big astronomical data for machine vision purpose // IEEE 28th International Symposium on Industrial Electronics (ISIE). – 2019. – 1706-1710 p. [DOI: 10.1109/ISIE.2019.8781270](#)
11. **V.S. Akhmetov**, V.M. Andruk, Yu.I. Protsyuk, H. Relke, I. Eglitis / New astrometric reduction of the supercosmos plate archive: first results // Odessa Astronomy Publications, –2019. –Vol. 32, P.178 <https://doi.org/10.18524/1810-4215.2019.32.181557>
12. V. Andruk, I. Eglitis, Yu. Protsyuk, **V. Akhmetov**, L. Pakuliak, S. Shatokhina, O. Yizhakevych / Photometry of stars for astronegatives with a single exposure // Odessa Astronomy Publications, –2019. –Vol. 32, P.181 <https://doi.org/10.18524/1810-4215.2019.32.181596>
13. Protsyuk Yu.I., Relke H., **Akhmetov V.S.**, Muminov M.M., Ehgamberdiev Sh.A., Kokhirova G. On the fon astroplate project accomplishment // Odessa Astronomy Publications, –2019. – Vol. 32, P.185 <https://doi.org/10.18524/1810-4215.2019.32.181558>
14. V. Khramtsov, D.V. Dobrycheva, M.Yu. Vasylenko, **V.S. Akhmetov** - Deep learning for morphological classification of galaxies from SDSS, Odessa Astronomy Publications, –2019. – Vol. 32, P.21 <https://doi.org/10.18524/1810-4215.2019.32.182092>

15. V. Akhmetov, S. Khlamov, A. Dmytrenko. Fast coordinate cross-match tool for large astronomical catalogue // Springer Nature Switzerland AG 2019: CSIT 2018, AISC 871, pp. 3–16, 2019. [https://doi.org/10.1007/978-3-030-01069-0\\_1](https://doi.org/10.1007/978-3-030-01069-0_1)
16. Khramtsov, V; Akhmetov, V. / Machine-learning identification of extragalactic objects in the optical-infrared all-sky surveys // Proceedings of the 13th International Scientific and Technical Conference on Computer Sciences and Information Technologies, CSIT 2018 DOI: [10.1109/STC-CSIT.2018.8526686](https://doi.org/10.1109/STC-CSIT.2018.8526686).
17. Akhmetov, V; Dmytrenko, A; Khlamov, S. / Fast coordinate cross-match tool for large astronomical catalogue // Proceedings of the 13th International Scientific and Technical Conference on Computer Sciences and Information Technologies, CSIT 2018 DOI: [10.1109/STC-CSIT.2018.8526759](https://doi.org/10.1109/STC-CSIT.2018.8526759).
18. V. S. Akhmetov, S. V. Khlamov, V. M. Andruk, Yu. I. Protsyuk. The catalogues analysis of stars equatorial coordinates and B-magnitude of the FON project // Odessa Astronomical Publications. – 2018. – Vol. 31. –P. 199-203 (<https://doi.org/10.18524/1810-4215.2018.31.144734>)
19. P.N. Fedorov, V.S. Akhmetov, A.B. Velichko. Testing stellar proper motions of TGAS stars using data from the HSOY, UCAC5 and PMA catalogues // Mon Not R Astron Soc – 2018. Vol. 476, Iss. 2, -P. 2743-2750. (<https://doi.org/10.1093/mnras/sty415>)
20. V.P. Khramtsov, V.S. Akhmetov. Supervised automatic identification of extragalactic sources in the WISE×SuperCOSMOS catalogue // Odessa Astronomical Publications. –2017. –Vol. 30 , P. 178
21. Dmytrenko A.M., Akhmetov V.S. Astronomical image processing for high-accurate astrometry data // Odessa Astronomical Publications. –2017. –Vol. 30, P.163
22. V.S. Akhmetov, P.N. Fedorov, A.B. Velichko. The PMA catalogue as a realization of the extragalactic reference system in optical and near infrared wavelengths // Proceedings of the IAU, Vol.12, Symposium S330, pp. 81-82. (<https://doi.org/10.1017/S174392131700607X>)
23. A.B. Velichko, V.S. Akhmetov, P.N. Fedorov. Kinematics of our Galaxy from the PMA and TGAS catalogues // Proceedings of the IAU, Vol.12, Symposium S330, pp. 100-103.(<https://doi.org/10.1017/S1743921317006068>)
24. V.S. Akhmetov, P. N. Fedorov, A. B. Velichko, V. M. Shulga. The PMA Catalogue: 420 million positions and absolute proper motions// Mon Not R Astron Soc – 2017. Vol. 469, Iss. 1, -P. 763-773. (<http://mnras.oxfordjournals.org/content/469/1/763>)
25. V.S. Akhmetov, P. N. Fedorov, A. B. Velichko, V. M. Shulga. VizieR Online Data Catalog: The PMA Catalogue: 420 million positions and absolute proper motions (Akhmetov+, 2017) [Electronic resource] // Centre de Données astronomiques de Strasbourg – (<http://cdsarc.u-strasbg.fr/viz-bin/Cat?I/341>)
26. V.S. Akhmetov. The investigation of the FON3 catalogue data using Wielen method//Odessa Astronomical Publications. –2016. –Vol. 29, P. 116-119. (<http://oap.onu.edu.ua/article/view/85125>)
27. P.N. Fedorov, V.S. Akhmetov, A.B. Velichko,V.M. Shulga. The kinematics of the Galaxy by proper motion of stars // Space science and technology. –2015. –Vol. 21/6, P. 62-67 (in Russian)
28. V.S. Akhmetov, P.N. Fedorov, A.B. Velichko,V.M. Shulga. The kinematics parameters of the Galaxy using data of modern astrometric catalogues//Odessa Astronomical Publications. – 2015. –Vol. 28/2, P. 154-157. (<http://adsabs.harvard.edu/abs/2015OAP....28..154A>)
29. P. N. Fedorov, V. S. Akhmetov, V. M. Shulga. The reference frame for the XPM2 // Mon. Notic. Roy. Astron. Soc. – 2014. –Vol. 440, Iss. 1. –P. 624 (<http://mnras.oxfordjournals.org/content/440/1/624>)
30. I. B. Vavilova, L. K. Pakulyak, A. A. Shlyapnikov, Yu. I. Protsyuk, V. E. Savanevich, I. L. Andronov , V. N. Andruk, N. N. Kondrashova, A. V. Baklanov, A. V. Golovin , P. N. Fedorov , V. S. Akhmetov, I. I. Isak, V. V. Golovnya, N. V. Virun, A. V. Zolotukhina, L. V. Kazantseva, N. A. Virnina, V. V. Breus, S. G. Kashuba, L. L. Chinarova, L. S. Kudashkina, V. P. Epishev, Mazhaev A. E. Astroinformation resource of the Ukrainian virtual observatory: Joint observational data archive, scientific tasks, and software // Kinematics and Physics of Celestial Bodies –2012. –Vol. 28, Iss 2. P. 85–102.

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32. Fedorov, P. N.; **Akhmetov, V. S.**; Yatskiv, Ya. S. The XPM catalogue as a realisation of the extragalactic reference system in optical and near infrared wavelenghts//Proceedings of the Journées 2010 "Systèmes de référence spatio-temporels" ISBN 978-2-901057-64-2, p. 117-120
33. P. N. Fedorov, **V. S. Akhmetov**, V. V. Bobylev. Residual rotation of the Hipparcos/Tycho-2 system as determined from the data of the XPM catalogue // Mon. Notic. Roy. Astron. Soc. – 2011. – Vol. 416, Iss. 1. – P. 403–408. (<http://mnras.oxfordjournals.org/content/416/1/403>)
34. P. N. Fedorov, **V. S. Akhmetov**, V. V. Bobylev, A. G. Goncharov. The XPM catalogue as a realization of the ICRS in optical and near-infrared ranges of wavelengths // Mon. Notic. Roy. Astron. Soc. – 2011. –Vol. 415, Iss. 1. – P. 665–672. (<http://mnras.oxfordjournals.org/content/415/1/665>)
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36. G.A. Gontcharov, A.T. Bajkova, P.N. Fedorov, **V.S. Akhmetov**. Candidate subdwarfs and white dwarfs from the 2MASS, Tycho-2, XPM and UCAC3 catalogues // Mon. Notic. Roy. Astron. Soc. – 2011. – Vol. 413, Iss. 3. – P. 1581–1599. (<http://mnras.oxfordjournals.org/content/416/3/1581>)
37. P. N. Fedorov, **V. S. Akhmetov**, V. V. Bobylev, A. T. Bajkova. An investigation of the absolute proper motions of the XPM catalogue // Mon. Notic. Roy. Astron. Soc. – 2010. – Vol. 406, Iss. 3. – P. 1734–1744. (<http://mnras.oxfordjournals.org/content/406/3/1734>)
38. V.V. Bobylev, P.N. Fedorov, A.T. Bajkova, **V.S. Akhmetov**. Determining the Orientation Parameters of the ICRS/UCAC2 System using the Kharkov Catalog of Absolute Stellar Proper Motions // Astronomy Letters. –2010. –Vol. 36, No. 7. – P. 506–513. (<http://arxiv.org/abs/1006.5154>)
39. **V. S. Akhmetov**, P. N. Fedorov. Kinematic parameters of the Galaxy derived using 270 million the absolute proper motion of stars // Известия Главной астрономической обсерватории в Пулкове. –2009. –No.219.Iss.4. – P. 39–44 (in Russian)
40. P. N. Fedorov, A. A. Myznikov and **V. S. Akhmetov**. The XPM Catalogue: absolute proper motions of 280 million stars // Mon. Notic. Roy. Astron. Soc. – 2009. – Vol. 393, Iss. 1. – P. 133 – 138. (<http://mnras.oxfordjournals.org/content/393/1/133>)

## ТЕЗИСИ НА КОНФЕРЕНЦІЯХ/ ABSTRACTS.

1. Sophia Denyschenko, **Volodymyr Akhmetov**, Victoria Serdiuk / Distribution of objects located closer than 10 pc according to the 2nd release of the Gaia catalogue// Матеріали конференції (IX Ukrainian Scientific Conference): “Academic and Scientific Challenges of Diverse Fields of Knowledge in the 21st century”, Видавництво ХНУ імені В.Н. Каразіна, 2020
2. Dmytrenko, A., **Akhmetov, V.**, Serdiuk V. Results of stellar density detection in the GaiaDR2 data. Матеріали конференції (IX Ukrainian Scientific Conference): “Academic and Scientific Challenges of Diverse Fields of Knowledge in the 21st century”, Видавництво ХНУ імені В.Н. Каразіна, 2020
3. Daria Dobrycheva, Vladislav Khrantsov, Maksym Vasylenko, Irina Vavilova, Andrii Elyiv, **Volodymyr Akhmetov**, Artem Dmytrenko, Sergii Khlamov “Deep similarity learning to infer the morphological properties of galaxies at  $z < 0.1$ ”, The European Astronomical Society (EAS) Annual Meeting, Лейден, Нідерланди, з 29 червня по 3 липня 2020 року
4. Kyrylo Soroka, **Volodymyr Akhmetov**, Anatoliy Vasylenko, Margarita Sobolenko, Kateryna Vovk. Radio to X-ray multiband sample for automated AGN search // XI Conference of Young Scientists "Problems of Theoretical Physics", Kiev, Ukraine, 21-23 December 2020

5. **V. S. Akhmetov**, P. N. Fedorov, S. V. Khlamov, A. M. Dmytrenko, V. P. Khramtsov / Analysis of the stellar proper motions of GAIA DR2 and PMA catalogues // Proceedings of the 6th Gamow International Conference in Odessa: «New Trends in Astrophysics, Cosmology and Radioastronomy after Gamow» (Ukraine, Odessa, Chernomorka, 11–18 August, 2019): сб. матер. конф. – Одесса, Украина, 2019. – С. 24
6. V. P. Vlasenko, **V. S. Akhmetov**, V. E. Savanevych, O. B. Briukhovetskyi, E. N. Dikov, S. V. Khlamov / CoLiTecSAT. Matched filter for extended images of objects // Proceedings of the 6th Gamow International Conference in Odessa: «New Trends in Astrophysics, Cosmology and Radioastronomy after Gamow» (Ukraine, Odessa, Chernomorka, 11–18 August, 2019): сб. матер. конф. – Одесса, Украина, 2019. – С. 28.
7. **V. Akhmetov**, S. Khlamov, V. Savanevych, E. Dikov / Cloud computing analysis of Indian ASAT test on March 27, 2019 // Proceedings of the IEEE International Scientific and Practical Conference "Problems of Infocommunications. Science and Technology" (PIC S&T'2019), Kyiv, Ukraine, October 8th – 11th, 2019. – P. 315–318.
8. **V. Akhmetov**, S. Khlamov, A. Dmytrenko, V. Khramtsov / New algorithm for astrometric reduction of the wide-field images // Proceedings of the 14th International Scientific and Technical Conference on Computer Sciences and Information Technologies, CSIT 2019, Lviv, Ukraine, September 17th – 20th, 2019. – P. 106–109.
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