

Sergey A. Khoperskov

Date of birth: 25/04/1988

Languages: Russian (native), English (fluent),
French (basic), Italian (basic), German (basic)

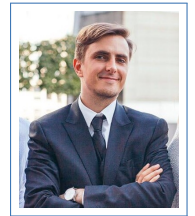
Witzlebenstrasse 1, 14057

Berlin, Germany

+33785559237

✉ sergey.khoperskov@gmail.com

www.sergeykhoperskov.com



Research interest

Galaxies	Milky Way, dynamics, structure and chemical evolution of galaxies, globular clusters
ISM	Galactic star formation, molecular clouds, galactic magnetic field
Simulations	N -body/hydrodynamics, MHD, HPC and parallel computing
Machine learning	Decision Trees, Random Forest, Neural Networks

Academic positions

10/2020 – now	Postdoc , <i>Leibniz-Institut für Astrophysik Potsdam (AIP), Potsdam, Germany.</i>
10/2018 – 10/2020	Postdoc , <i>Max Planck Inst. für Extraterrestrische Physik (MPE), Garching, Germany.</i>
05/2016 – 10/2018	ANR researcher , <i>GEPI, Observatoire de Paris, CNRS, Meudon, France.</i>
09/2016 – 09/2018	Visiting scientist , <i>Astronomisches Rechen-Institut, Heidelberg, Germany.</i>
05/2014 – 12/2015	Postdoc , <i>Dipartimento di Fisica, Università degli Studi di Milano, Milan, Italy.</i>
02/2013 – 04/2014	Adjunct researcher , <i>Sternberg Astronomical Institute, Moscow, Russia.</i>
09/2011 – 04/2013	Doctoral research student , <i>Institute of Astronomy of the RAS, Moscow, Russia.</i>

Education

09/2011 – 04/2013	Ph.D. , <i>Sternberg Astronomical Institute of the Moscow State Univ.</i> , thesis: Evolution of disk galaxies: study of the hierarchy of structures, supervisor: Prof. Boris Shustov.
09/2009 – 06/2011	M.Sc. in Computational Physics (with honors) , <i>Volgograd State Univ.</i> , thesis: <i>Simulations of the gas dynamics by using parallel computing</i> , supervisor: Dr. Mike Eremin.
09/2005 – 06/2009	B.Sc. in Physics (with honors) , <i>Volgograd State Univ.</i> , thesis: <i>Galactic gaseous disks evolution</i> , supervisor: Dr. Mike Eremin.

Awarded research funding

total funding as a PI \sim 200 k€

2019 – 2020	PI , <i>Supercomputer simulations of the Milky Way and nearby galaxies</i> , Russian Science Foundation.
2017 – 2018	Co-I , <i>The assembly history of disk galaxies over the last 8 billion years</i> , Indo-French Centre for the Promotion of Advanced Research, CEFIPRA grant, PIs: F. Combes, K. Saha.
2016 – 2018	Co-I , <i>MOD4Gaia</i> , Agence Nationale de la Recherche project, P.I.: P. Di Matteo.
2016 – 2018	Co-I , <i>Dynamical mechanisms of accretion in galactic nuclei</i> , VolkswagenStiftung, PIs: R. Spurzem, A. Just, P. Berczik, E. Polyachenko.
2016, 2018	PSL fellowship, Paris Observatory (declined for personal reasons)
2016	PI , <i>Bending instability in galaxies with counterrotation</i> , RFBR.
2016 – 2018	PI , <i>Magnetic field and dynamical processes in disk galaxies</i> , RFBR.
2015 – 2016	PI , <i>Disk galaxies evolution: star formation and chemical evolution.</i>
2014 – 2015	Co-I , <i>Chemical and Dynamical Evolution of the Milky Way and Local Group Galaxies</i> , Italian National Research Program, PI: F. Matteucci.
2014	PI , <i>Dust grains transport in the magnetized ISM at the galactic scales</i> , RFBR.
2012	PI , <i>Kinematic manifestations of the triaxial dark matter in disk galaxies</i> , RFBR.
2012 – 2016	Co-I of 18 projects supported by the Russian Foundation for Basic Research (RFBR).

Outreach & professional service

- Referee for Nature Astronomy, MNRAS(L), A&A(L), ApJ, Astronomy Reports, Galaxies, Astronomy Letters, Baltic astronomy (5-7 papers per year)
- 2020 – 2021 Referee for DiRAC (national HPC resource for the UK in astronomy, cosmology, particle physics and nuclear physics)
- 2020->2021 Co-organizer of Special Session *Âges stellaires et évolution galactique*, French astronomical society meeting (SF2A, Paris)
- 2018 – 2020 Chair of Dynamics group seminar at OPINAS, MPE
since 2019 Member of the Editorial Board of the journal *Mathematical Physics & Computer Simulations*
- 2016 – 2018 Co-supervisor of internship students at GEPI, Paris Observatory
- 4–7/07/2017 Co-organizer of Special Session *Chemical and dynamical modelling of Milky Way type galaxies*, French astronomical society meeting (SF2A, Paris)
- 19–23/09/2016 LOC member of the international conference *The Milky Way and its environment* (IAP, Paris),
since 2015 Member of International Astronomical Union
- 2012 – 2013 Volunteer guide at the Observatory of Institute of Astronomy of the RAS

Computational skills and HPC experience

Extensive knowledge: C/C++, Python, Matlab, Fortran, TOPCAT, bash, R, IDL

Parallel computing: OpenMP, MPI, CUDA-GPU. **Machine learning:** pytorch, sklearn

High-performance computing (HPC) experience:

- 2018 – now IRENE, Tres Grand Centre de calcul du CEA, France
- 2018 – 2020 Cobra/Draco/Hydra, Max Planck Computing and Data Facility, Garching, Germany
- 2016 – now OCCIGEN, GENCI, CINES, Montpellier, France
- 2017 – 2018 MilkyWay cluster & GPU cluster HYDRA, Heidelberg University, Heidelberg, Germany
- 2015 – now GPU cluster KEPLER, ARI, Heidelberg, Germany
- 2013 – 2015 MVS100k / MVS10p, Joint Supercomputer Center of the RAS, Moscow, Russia
- 2010 – now Lomonosov - 1/2 & Chebyshov, Moscow State Univ., Research Computing Center, Russia

Honors, awards and media

- 2020 [ESA: fascinating Gaia revelations about the Milky Way](#)
- 2019 [Paris Observatory news about the Gaia phase-space spiral](#)
- 2017 Elected in a talent pool of the Federal Agency of the RAS
- 2013 Best PhD thesis award. Institute of astronomy of the Russian Acad. of Sci.
- 2012 - 2013 Award for doctoral research students. Non-profit "Dynasty Foundation"
- 2011 Scholarship for graduate students. Non-profit "Dynasty Foundation"
- 2011 Exceptional award. Volgograd Regional Council of Science and Technology
- 2010 Individual award. Supercomputer research program by Intel Corporation

References

Prof. Ortwin Gerhard
Dynamics group leader
Max-Planck-Institut
extraterrestrische Physik
gerhard@mpe.mpg.de

Dr. Paola Di Matteo
Associated Astronomer
GEPI
Observatoire de Paris
paola.dimatteo@obspm.fr

Dr. Misha Haywood
Associated Astronomer
GEPI
Observatoire de Paris
misha.haywood@obspm.fr

Prof. Françoise Combes
Prof. au Collège de France
LERMA
Observatoire de Paris
francoise.combes@obspm.fr

Prof. Andreas Just
Full Professor
ARI, ZAH
Universitaet Heidelberg
just@ari.uni-heidelberg.de

Prof. Peter Berczik
Researcher
National Astronomical Obs of China
Chinese Academy of Sciences
berczik@nao.cas.cn

Prof. Giuseppe Bertin
Full Professor
Departamento di Fisica
Università degli Studi di Milano
giuseppe.bertin@unimi.it

Selected conference talks

in total 68 presentations, of which 2 as invited speaker, 46 contributed and 20 seminars

12/2020	Milky Way spiral arms from Gaia DR2, virtual meeting, Linking the Galactic and Extragalactic, Woolong, Australia
09/2019	Modelling of the Milky Way phase-space, WD1 Gaia Workshop, Cambridge, UK
04/2019	Echo of the Milky Way bar: origin of the phase-space spirals, 53rd ESLAB symposium: the Gaia universe, Noordwijk, The Netherlands
11/2018	Bimodality of $[\alpha/Fe] - [Fe/H]$ in thick and thin galactic disks, The life and times of the Milky Way, Shanghai, China
01/2018	Chemo-dynamical modelling of thick and thin disks formation, Chemical and dynamical evolution of galaxies, Sesto, Italy
10/2017	Bar quenching in gas-rich galaxies, Role of gas in galaxies, Valetta, Malta
08/2017	Star formation in Milky Way-type galaxies, Thick, thin dark disks, Ascona, Switzerland
03/2016	Spiral pattern beyond optical radius: numerical simulations and synthetic HI observations, Formation and Evolution of Galaxy Outskirts (IAUS321), Toledo, Spain
03/2016	Giant molecular clouds in galaxy scale simulations, The formation and destruction of molecular clouds (EWASS), Tenerife, Spain
01/2015	Chemical evolution of giant molecular clouds in galactic scale simulations, Chemical and dynamical evolution of the MW and Local Group galaxies, Sesto, Italy
09/2014	Giant molecular clouds in galactic scale simulations, Galactic and Extragalactic Star Formation, Marseille, France
09/2013	Multi-component models of GMCs formation, Exascale Computing in Astrophysics, Ascona, Switzerland
08/2013	Multi-component galaxies: from N -body to chemistry and magnetic fields, XXV IUPAP Conference on Computational Physics, Moscow, Russia

List of publications

ADS Query

Refereed papers (24 as a first author)

1. **S. Khoperskov**, I. Minchev et al. "Bar-spirals coupling in the Milky Way-type galaxies: fuelling galactic nuclei and multiple populations in chemical abundance space" AA, **2020** (submitted)
2. **S. Khoperskov** & O. Gerhard. "Local moving groups is a part of something bigger. How the Milky Way structure shapes the Solar neighbourhood kinematics and $[Fe/H]$ patterns", MNRAS, **2020** (submitted)
3. **S. Khoperskov**, M. Haywood, O. Snaith, P. Di Matteo, M. Lehnert et al. "Bimodality of $[\alpha/Fe]$ -distributions in Milky Way-type galaxies]Bimodality of $[\alpha/Fe]$ -distributions in Milky Way-type galaxies with thick and thin discs" MNRAS, **2020** (accepted)
4. B. Ciambur, F. Fragkoudi, **S. Khoperskov**, P. Di Matteo, F. Combes "Double X/Peanut Structures in Barred Galaxies – Insights from an N -body Simulation", MNRAS, **2020** (accepted)
5. **S. Khoperskov**, I. Zinchenko, B. Avramov, S. Khrapov, P. Berczik et al. "Extreme kinematic misalignment in IllustrisTNG galaxies: origin, structure and internal dynamics of galaxies with a large-scale counterrotation" MNRAS, **2020** (accepted)
6. **S. Khoperskov**, Di Matteo P., Haywood M., Gómez A., Snaith O., "Escapees from the bar resonances. On the presence of low-eccentricity, metal-rich stars at the Solar vicinity", A&A, **2020**, 638, 144
7. **S. Khoperskov**, Gerhard O., Di Matteo P., Haywood M., Katz D., Khrapov S., Khoperskov A., Arnaboldi M., "Hic sunt dracones: Cartography of the Milky Way spiral arms and bar resonances with Gaia Data Release 2.", A&A Letters, **2020**, 634, L8 ([ESA press release](#))
8. P. Di Matteo, M. Haywood, M.D. Lehnert, D. Katz, **S. Khoperskov**, O.N. Snaith, A. Gómez, N. Robichon "The Milky Way has no in-situ halo other than the heated thick disc. Composition of the stellar halo and age-dating the last significant merger with Gaia DR2 and APOGEE", A&A, **2019**, 632, 4
9. **S. Khoperskov**, P. Di Matteo, O. Gerhard, D. Katz, M. Haywood, F. Combes, P. Berczik, A. Gomez "The echo of the bar buckling: phase-space spirals in Gaia DR2", A&A Letters, **2019**, 622, 6
10. F. Fragkoudi, D. Katz, W. Trick, S. D. M. White, P. Di Matteo, M.C. Sormani, **S. Khoperskov**, et al. "On the ridges, undulations, and streams in Gaia DR2: linking the topography of phase space to the orbital structure of an N -body bar", MNRAS, **2019**, 488, 3324

11. M. Haywood, O. Snaith, M. D. Lehnert, P. Di Matteo, **S. Khoperskov**. "Revisiting long-standing puzzles of the Milky Way: the Sun and its vicinity as typical outer disk chemical evolution" *A&A*, **2019**, 625, 105
12. A. Mastrobuono-Battisti, **S. Khoperskov**, P. Di Matteo, M. Haywood, "Mergers, tidal interactions, and mass exchange in a population of disc globular clusters: II. Long-term evolution", *A&A*, **2019**, 622, 86
13. P. Di Matteo, F. Fragkoudi, **S. Khoperskov** et al. "The disc origin of the Milky Way bulge: I. On the necessity of the thick disc", *A&A*, **2019**, 628, 11
14. **S. Khoperskov**, A. Mastrobuono-Battisti, P. Di Matteo, M. Haywood, "Mergers, tidal interactions, and mass exchange in a population of disc globular clusters", *A&A*, 620, A154, **2018** ([A&A cover image, vol. 620](#))
15. **S. Khoperskov**, Y. Venichenko, S. Khrapov, E. Vasiliev "High performance computing of magnetized galactic discs" *Supercomputing frontiers and innovations*, 5(4), 103, **2018**
16. M. Haywood, P. Di Matteo, M. Lehnert, O. Snaith, **S. Khoperskov**, A. Gomez "In disguise or out of reach: first clues about in-situ and accreted stars in the stellar halo of the Milky Way from Gaia DR2", *ApJ*, 863, 113, **2018**
17. A. Saburova, I. Chilingarian, I. Katkov, O. Egorov, A. Kasparova, **S. Khoperskov**, R. Uklein, O. Vozyakova "A Malin 1 'cousin' with counter-rotation: internal dynamics and stellar content of the giant low surface brightness galaxy UGC 1922", *MNRAS*, 481, 3534, **2018**
18. M. Haywood, P. Di Matteo, M. Lehnert, O. Snaith, F. Fragkoudi, **S. Khoperskov** "Phylogeny of the Milky Way's inner disk and bulge populations", *A&A*, 618, 78, **2018**
19. **S. Khoperskov**, P. Di Matteo, M. Haywood, F. Combes, "Stellar metallicity variations across spiral arms in disk galaxies with multiple populations", *A&A Letters*, 611, 2, **2018**
20. F. Fragkoudi, P. Di Matteo, M. Haywood., **S. Khoperskov** et al. "The disc origin of the Milky Way bulge II. Dissecting the chemo-morphological relations using N-body simulations and APOGEE", *A&A*, 616, 180, **2018**
21. S. S. Khrapov, **S. A. Khoperskov**, A. V. Khoperskov, "New features of parallel implementation of N -body problems on GPUs", *Mathematical modelling programming & computer software*, 11(1), 124, **2018**
22. **S. A. Khoperskov**, S. S. Khrapov, "Global enhancement and structure formation of the magnetic field in spiral galaxies", *A&A*, 609, 104, **2018**
23. **S. Khoperskov**, M. Haywood, P. Di Matteo, M. Lehnert, F. Combes, "Bar quenching in gas-rich barred galaxies", *A&A*, 609, 60, **2018**
24. F. Fragkoudi, P. Di Matteo, M. Haywood, **S. Khoperskov**, A. Gomez, M. Schultheis, F. Combes, B. Semelin "What the Milky Way bulge reveals about the initial metallicity gradients in the disc", *A&A Letters*, 607, 4, **2017**
25. **S. Khoperskov**, E. Vasiliev, A. Khoperskov, "Molecular clouds in galaxies: star formation and conversion factor", *MSAI*, 88 (4), 739, **2017**
26. A. Saburova, I. Katkov, **S. Khoperskov**, A. Zasov, R. Uklein "The study of two barred galaxies with curious kinematical features", *MNRAS*, 470, 20, **2017**
27. **S. Khoperskov**, E. Vasiliev, "A Kennicutt-Schmidt relation at molecular clouds scales and beyond", *MNRAS*, 468 (1), 920-926, **2017**
28. **S. Khoperskov**, G. Bertin, "Disk heating and bending instability in galaxies with counterrotation", *A&A*, 597, 103-125, **2017**
29. A.V. Zasov, A.S. Saburova, A.V. Khoperskov, **S. A. Khoperskov**, "Dark matter in galaxies" *Phys. Usp. Physics-Uspekh*, 60 (1), 82 p., **2017**
30. V. Korchagin, **S. Khoperskov**, A. Khoperskov, "Role of gaseous disk in the formation of the spiral structure of the Milky Way galaxy", *Baltic astronomy*, 25, 356-361, **2016**
31. E. Vasiliev, **S. Khoperskov**, A. Khoperskov, "Molecular clouds and star formation rate in disk galaxies", *Baltic astronomy*, 25, 324-330, **2016**
32. M. S. Murga, **S. A. Khoperskov**, D. S. Wiebe, "The evolution of hydrocarbon dust grains in the interstellar medium and its influence on the infrared spectra of dust", *Astronomy Reports*, 60, 669-681, **2016**
33. M. S. Murga, **S. A. Khoperskov**, D. S. Wiebe, "Restructuring and destruction of hydrocarbon dust in the interstellar medium", *Astronomy Reports*, 60, 233-251, **2016**
34. **S. A. Khoperskov**, E. O. Vasiliev, D.A. Ladeyschikov, A. M. Sobolev, A. V. Khoperskov, "Giant molecular cloud scaling relations: role of the cloud definition" *MNRAS*, 455 (2), 1782-1795, **2016**
35. **S. Khoperskov**, G. Bertin, "Synthetic HI observations of spiral structure in the outer disk in galaxies", *Journal of Plasma Physics*, 81 (6), id. 495810607, 14 p., **2015**
36. A. V. Zasov, **S. A. Khoperskov**, "Giant molecular clouds in M 33: are they susceptible to dynamical friction?", *MNRAS*, 452 (4), 4247-4251, **2015**
37. **S. Khoperskov**, G. Bertin, "Spiral density waves in the outer galactic gaseous discs", *MNRAS*, 451 (3), 2889-2899, **2015**
38. M. A. Butenko, A. V. Khoperskov, **S.A. Khoperskov** "Galactic spiral pattern beyond the optical size induced by the triaxial dark halo", *Baltic Astronomy*, 24, 119-125, **2015**

39. A. V. Moiseev, **S. A. Khoperskov**, A. V. Khoperskov, A. S. Saburova, V. P. Reshetnikov, "The polar rings galaxies structure and kinematics: new observations and estimation of the dark halo shape", *Baltic Astronomy*, 24, 76-83, **2015**
40. **S. A. Khoperskov**, A. V. Moiseev, A.V. Khoperskov, A.S. Saburova "To be or not to be oblate: the shape of the dark matter halo in the polar ring galaxies", *MNRAS*, 441 (2), 2650-2662, **2014**
41. **S. A. Khoperskov**, E. Vasiliev, A. Khoperskov, V. Lubimov "Numerical code for multi-component galaxies: from N -body to chemistry and magnetic fields", *Journal of Physics: Conference Series* 510, id. 012001, **2014**
42. A. V. Khoperskov, **S. A. Khoperskov**, A. V. Zasov, D. V. Bizyaev, S. S. Khrapov, "Interaction between collisionless galactic discs and non-axisymmetric dark matter haloes", *MNRAS*, 431, 1230-1239, **2013**
43. **S. A. Khoperskov**, E. O. Vasiliev, A. M. Sobolev, A. V. Khoperskov, "The simulation of molecular clouds formation in the Milky Way", *MNRAS*, 428, 2311-2320, **2013**
44. **S. A. Khoperskov**, A. V. Khoperskov, I. S. Khrykin, V. I. Korchagin, D. I. Casetti-Dinescu, T. Girard, W. van Altena, D. Maitra, "Global gravitationally organized spiral waves and the structure of NGC 5247", *MNRAS*, 427, 1983-1993, **2012**
45. **S. A. Khoperskov**, B. M. Shustov, A.V. Khoperskov, "Interaction of the dark-matter cusp with the baryonic component in disk galaxies", *Astronomy Reports*, 56, 664-671, **2012**
46. A. V. Khoperskov, M. A. Eremin, **S. A. Khoperskov**, M. A. Butenko, A. G. Morozov, "Dynamics of gaseous disks in a non-axisymmetric dark halo", *Astronomy Reports*, 56, 16-28, **2012**
47. **S. A. Khoperskov**, A. V. Khoperskov, M. A. Eremin, M. A. Butenko, "Polygonal structures in a gaseous disk: Numerical simulations", *Astronomy Letters*, 37, 563-575, **2012**

Refereed conference proceedings

48. A. Mastrobuono-Battisti, **S. Khoperskov**, P. Di Matteo, M. Haywood "Globular cluster mergers in the Galactic disc. The amazing life of a globular cluster: tidal interactions and mergers in the Galactic disc" *IAIUS 351 proceedings*, **2020**
49. **S. Khoperskov**, E. Vasiliev "Velocity gradients of giant molecular clouds at galactic scales" *Proceedings of the annual meeting of the French Society of Astronomy & Astrophysics*, 25, **2018**
50. **S. Khoperskov**, M. Haywood, P. Di Matteo, M. Lehnert, F. Combes, "Star formation quenching in gas-rich Milky Way type galaxies", *IAUS proceedings*, 334, 314, **2018**
51. F. Fragkoudi, P. Di Matteo, M. Haywood, A. Gomez, **S. Khoperskov**, D. Katz, M. Schultheis, F. Combes, B. Semelin, "Rediscovering the disc origin of the Milky Way bulge", *IAUS proceedings*, 334, 288, **2018**
52. **S. A. Khoperskov**, G. Bertin, "Spiral patterns beyond the optical radius: numerical simulations and synthetic HI observations", *Proceedings of IAUS 321, "Formation and evolution of galaxy outskirts"*, Eds. Gil de Paz, Lee & Knapen, Cambridge University Press 321, 81-83, **2017**
53. **S. A. Khoperskov**, A. V. Moiseev, A.V. Khoperskov, A.S. Saburova "The shape of dark matter halo in PRG NGC 4262", *Astronomical Society of the Pacific Conf. Ser.*, 486, 221-225, **2014**
54. **S. A. Khoperskov** "Halo of galaxies", *Physics of space: annual conf. proceedings*, 46, 121-132, **2014** (review)
55. **S. A. Khoperskov**, Yu. A. Shchekinov "Transport of the charged dust grains to the galactic halo", *Proceedings of Science*, id.60, 4 p. **2013**
56. **S. A. Khoperskov**, A. Moiseev, A. Khoperskov, "Polar rings dynamics in the triaxial dark matter halo", *Memorie della Societa Astronomica Italiana Supplement*, 25, 51-54, **2013**
57. **S. A. Khoperskov**, M. A. Eremin, A. V. Khoperskov, "Polygonal structures in galactic gaseous disks", *Astronomical and Astrophysical Transactions*, 27, 245-250, **2012**