

Dr. Roman V. Shcherbakov

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University of Maryland,
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College Park, MD 20742

ACADEMIC POSITIONS

University of Maryland, College Park, MD

Hubble Postdoctoral Fellow

2011-2014

University PI: Prof. Christopher Reynolds

EDUCATION

Harvard University, Cambridge, MA

PhD in Astronomy

2011, May

Dissertation: “Dynamical and Radiative Modeling of Sagittarius A*”

Advisor: Prof. Ramesh Narayan

Moscow Institute of Physics and Technology (MIPT), Dolgoprudny, Russia

Master of Applied Mathematics and Physics with Honors

2007, June

Thesis: “Magnetized Spherically Symmetric Flows”

Advisor: Prof. Vasily Beskin

ACADEMIC HONORS AND AWARDS

Hubble Fellowship

2011-2014

Rodger Doxsey AAS dissertation prize, runner-up

2011

NASA Earth and Space Science Fellowship

2008-2011

Philip Putnam Chase Memorial Fellowship

2006-2008

Dynasty Foundation Fellowship

2005-2006

International Soros Science Education Program grant “Student-2005”

2005

Russian Foundation for Basic Research (RFBR) Astronomy Fellowship

2004-2006

Best presentation at XLVII and XLVIII Scientific Conferences at MIPT

2004, 2005

MIPT Physics Olympiad for Undergraduate Students

2002-2005

absolute winner (1st out of 2000 students), four times in a row

Candidate for the National Russian Team to International Physics Olympiad (IPhO)

2000-2001

1ST/2ND AUTHOR REFEREED PUBLICATIONS

1. **Shcherbakov R. V.**, “[The Properties and Fate of the Galactic Center G2 Cloud](#)”, **ApJ**, 2014, 783, 31
2. **Shcherbakov R. V.**, Wong K.-W., Irwin J. A., Reynolds C. S., “[Modeling Hot Gas Flow in the Low-Luminosity Active Galactic Nucleus of NGC3115](#)”, **ApJ**, 2014, 782, 103
3. **Shcherbakov R. V.**, McKinney J. C., “[Submillimeter Quasi-Periodic Oscillations in Magnetically Choked Accretion Flows Models of Sgr A*](#)”, **ApJ Letters**, 2013, 774, 22
4. **Shcherbakov R. V.**, Pe'er A., Reynolds C. S., Haas R., Bode T., Laguna P., “[GRB060218 as a Tidal Disruption of a White Dwarf by an Intermediate Mass Black Hole](#)”, **ApJ**, 2013, 769, 85
5. **Shcherbakov R. V.**, Penna R. F., McKinney J. C., “[Sagittarius A* Accretion Flow and Black Hole Parameters from General Relativistic Dynamical and Polarized Radiative Modeling](#)”, **ApJ**, 2012, 755, 133
6. Haas R., **Shcherbakov R. V.**, Bode T., Laguna P., “[Tidal Disruptions of White Dwarfs from Ultra-close Encounters with Intermediate Mass Spinning Black Holes](#)”, **ApJ**, 2012, 749, 117
7. Huang L., **Shcherbakov R. V.**, “[Faraday Conversion and Rotation in Uniformly Magnetized Relativistic Plasmas](#)”, **MNRAS**, 2011, 416, 2574

8. **Shcherbakov R. V.**, Huang L., “General Relativistic Polarized Radiative Transfer: the Interface between Dynamics and Observations,” *MNRAS*, 2011, 410, 1052
9. **Shcherbakov R. V.**, Baganoff F. K., “Inflow-outflow Model with Conduction and Self-consistent Feeding for Sgr A*,” *ApJ*, 2010, 718, 504
10. **Shcherbakov R. V.**, “Dispersion of Waves in Relativistic Plasmas with Isotropic Particle Distributions,” *Physics of Plasmas*, 2009, 16, 032104
11. **Shcherbakov R. V.**, “Propagation Effects in Magnetized Transrelativistic Plasmas,” *ApJ*, 2008, 688, 695
12. **Shcherbakov R. V.**, “Spherically Symmetric Accretion Flows: Minimal Model with Magnetohydrodynamic Turbulence,” *ApJS*, 2008, 177, 493
13. **Shcherbakov R. V.**, “Region of Anomalous Compression under Bondi–Hoyle Accretion,” *Astronomy Letters*, 2005, 31, 591

OTHER REFEREED PUBLICATIONS

1. Wong K.-W., Irwin J. A., **Shcherbakov R. V.**, et al., “The Megasecond Chandra XVP Observation of NGC 3115: Witnessing The Flow of How Gas within the Bondi Radius”, *ApJ*, 2014, 780, 9
2. Wang Q. D. et al., “Dissecting X-ray-emitting Gas around the Center of our Galaxy,” *Science*, 2013, 341, 981
3. Kulkarni A., Penna R. F., **Shcherbakov R. V.**, et al., “Measuring Black Hole Spin by the Continuum-Fitting Method: Effect of Deviations from the Novikov-Thorne Disc Model,” *MNRAS*, 2011, 414, 1183-1194

GRANTS OTHER THAN FELLOWSHIPS

NSF 13-512/ NASA TCAN “Collaborative Research: Multi-Scale Plasma Flows around Black Holes” (co-I; PI: Jonathan McKinney)	2013-2016
NSF 13-512/ NASA TCAN “Collaborative Research: The multiscale physics of massive black hole formation, growth and feedback” (collaborator; PI: Christopher Reynolds)	2013-2016
VLA observation, 9hrs in semesters 13A and 13B (PI: Edo Berger)	2012
“Continued Monitoring of the Relativistic Outflow from a Tidal Disruption Event” Chandra X-ray Visionary project, 3Ms in Cycle 13 (PIs: Frederick Baganoff, Michael Nowak, Sera Markoff) “Chandra HETG Ultra-deep Gratings Spectroscopy of Sgr A* (CHUGSS)”	2011-2014
XSEDE computing time TG-PHY120005 on Nautilus (PI: Jonathan McKinney)	2012-2013
“Testing General Relativity using Accreting Black Holes” XSEDE computing time TG-AST080026N on Kraken (PI: Ramesh Narayan)	2011
“Simulations of Magnetized Relativistic Accretion Disks around Black Holes”	

COLLOQUIA & TALKS

- 2014** Stanford Astrophysics **Colloquium**
- 2013** Harvard ITC Seminar, MIT HETG group meeting, Georgia Institute of Technology CRA **Colloquium**, UNC seminar, NCSU Astro Journal Club, UMass Astronomy **Colloquium**
- 2012** UMD Joint Space Science Institute Talk, UNC Lunch Talk
- 2011** MIT HETG group meeting, UMD Theory Lunch Talk
- 2010** Princeton Wunch Talk, Johns Hopkins University Research Seminar, UMD Theory Lunch Talk

PROFESSIONAL SERVICES/MEMBERSHIPS**Conference organizer:**

SOC member, “Putting Accretion Theory to the Test”, Annapolis, MD, November 1-4, 2013

Panel review:

NASA ATP Program 2011, 2013

Referee: Nature, Astrophysical Journal, MNRAS, New Astronomy, Int. J. Physical Sciences

Judge: Chambliss Astronomy Achievement Student Award, 219-th and 223-rd AAS meetings

Organizer of talk series:

Astronomy Monday Theory Lunches at University of Maryland (29 speakers) 2012

Ramesh Naryan’s group meetings at Harvard (>40 speakers) 2010-2011

Research Forum at Harvard-Smithsonian Center for Astrophysics (~15 speakers) 2007

Membership: full AAS member, HEAD member

PUBLIC OUTREACH

“Bizarre Eating Habits of the Black Hole in the Center of the Milky Way” public talk for amateur astronomers at NOVAC, Fairfax, VA, USA, February 12, 2012

“Chandra X-rays the heart of the Milky Way” press conference at 215 AAS meeting, Washington, DC, USA, January 3-7, 2010 + correspondent articles in popular science magazines

2011 AAS Membership Calendar, month of August

NUMERICAL SKILLS, CODE DEVELOPMENT, DATA REDUCTION**Numerical code development and use**

- General relativistic [polarized radiative transfer code ASTRORAY](#) in C with OpenMP parallelization running on a supercomputer
- Fast exact evaluation of cyclo-synchrotron emissivities/absorptivities, Faraday rotation and Faraday conversion coefficients in C
- Geodesics integrator for Kerr black hole in C
- PLUTO code: 1D hydrodynamic accretion with sources
- CLOUDY code: photoionization and collisional ionization, fitting the properties of dust and lines

Symbolic computations in Mathematica 9

- Implementation of many XSPEC capabilities to fit X-ray data: models, ARF, RMF, PSF spreading
- Numerical models of radial gas flow solutions with conduction, model fitting
- All symbolic calculations, data analysis, and figures for papers, LevelScheme package

X-ray data reduction and fitting

- *Chandra*; *Swift* XRT; *Hubble* ACS, WFC3
- Model fitting with XSPEC, TCL scripting

TEACHING & ADVISING EXPERIENCE**University of Maryland**

Co-advising graduate students Anthony Speranza, Richard Anantua

(w/ Jonathan McKinney)

2012-2014

Harvard University

Teaching Fellow, “High Energy Astrophysics” (R. Narayan, J. Grindlay)

2009, Spring

Teaching Fellow, “Topics in Astrophysics” (R. Narayan)

2008, Spring

Teaching Fellow, “Cosmic Connections” (D. Charbonneau)

2007, Fall

Russia

Training the National Russian Team for International Junior Science Olympiad, devising problem sets for qualifying competitions, conducting qualifying competitions, holding lectures	2005, 2006
Training the National Russian Team for International Physics Olympiads, conducting qualifying competitions, holding lectures	2001-2006
Member of the Jury at Final (5 th) stage of Russian Physics Olympiads	2003-2006
Representative of the Central Methodical Committee of Russian Physics Olympiads at Federal District (4 th) stage of Physics Olympiads	2004, 2005
Member of the Central Methodical Committee of Russian Physics Olympiads	2002-2006
Individual tutor for physics and mathematics	2001-2006

CONFERENCE PRESENTATIONS & PROCEEDINGS

- “Hot Gas Flows onto Supermassive Black Holes from Bondi Radius to the Event Horizon” **invited talk** at Astro-GR meeting, Atlanta, GA, November 18-22, 2013
- “Feeding and Accretion in Low-luminosity AGNs” **invited talk** at “Putting Accretion Theory to the Test”, Annapolis, MD, November 1-4, 2013
- “Theory of multi-wavelength emission from G2 cloud” talk & **proceedings** paper at IAU Symposium 303, Santa Fe, NM, Sep 30-Oct 4, 2013
- “Parameters and Quasi-Periodic Variability of Sgr A* Accretion Flow from GRMHD Simulations” **invited talk** at “Radiative Processes near Black Holes” workshop, Princeton, NJ, USA, May 1-3, 2013
- “Modeling the Accretion Flow Onset in the Low-Luminosity Active Galactic Nucleus of NGC3115” talk at 13-th HEAD meeting, Monterey, CA, USA, April 7-11, 2013
- “A New Channel for II-GRBs: Tidal Disruptions of WDs by IMBHs” talk at 13-th HEAD meeting, Monterey, CA, USA, April 7-11, 2013
- “A New Channel for X-ray Flashes: Tidal Disruptions of WDs by IMBHs” talk at SNOWPAC-2013, Salt Lake City, Utah, USA, March 17-22, 2013
- “Constraining the Accretion Flow in Sgr A* by General Relativistic Dynamical and Polarized Radiative Modeling” poster & **proceedings** paper, IAU Symposium 290, Beijing, China, August 20-24, 2012
- “Feeding and Small-scale Feedback in Low-Luminosity AGNs” talk & **proceedings** paper, IAU Symposium 290, Beijing, China, August 20-24, 2012
- “Prompt Emission from Tidal Disruptions of White Dwarfs by Intermediate Mass Black Holes” talk & **proceedings** paper “Tidal Disruption events and AGN outbursts workshop”, Madrid, Spain, June 25-27, 2012
- “Ultra-close Tidal Disruptions of White Dwarfs by Intermediate Mass Black Holes” talk at “The Physics of Astronomical Transients”, Aspen, CO, January 21-27, 2012
- “Sgr A*: energizing the surroundings across epochs” talk at “The emerging, multi-wavelength view of the Galactic Centre Environment”, Heidelberg, Germany, October 17-20, 2011
/and/ at 219 AAS meeting, Austin, TX, USA, Jan 8-12, 2012
- “Flares from Disruptions of White Dwarfs by Intermediate Mass Black Holes” talk at 218 AAS meeting, Boston, MA, USA, May 23-26, 2011
- “Dynamical and Radiative Modeling of Sgr A*” dissertation talk at 217 AAS meeting, Seattle, WA, USA, January 9-13, 2011
- “A novel method to find the spin of a black hole with radiatively inefficient accretion” talk, “The Ins and Outs of Black Holes,” Annapolis, MD, USA, November 15-17, 2010
- “Quiescent X-rays from Sgr A* accretion flow: model fits observations” poster, “Accretion processes in X-rays: from white dwarfs to quasars,” Boston, MA, USA, July 13-15, 2010

- “Self-consistent modeling of Sgr A* quiescent emission” contributed talk, “Probing strong gravity near black holes,” Prague, CZ, February 15-18, 2010
- “Unified accretion model for Sgr A*” contributed talk at 215 AAS meeting, Washington, DC, USA, January 3-7, 2010
- “Inflow-outflow solution with stellar winds and conduction near Sgr A*” contributed talk and paper in **ASP proceedings**, “Galactic Center workshop 2009,” Shanghai, China, October 19-23, 2009
- “Constraining the accretion flow in Sgr A* by GR dynamical and radiative modeling” poster and paper in **ASP proceedings**, “GC workshop 2009,” Shanghai, China, October 19-23, 2009
- “Constraining the black hole parameters and the accretion flow in Sagittarius A* by GR dynamical and radiative modeling” poster at 213 AAS meeting, Long Beach, USA, January 4-8, 2009
- “Self-consistent modeling of accretion with magneto hydrodynamic turbulence” poster at “Magnetic field generation in experiments, geophysics and astrophysics,” Santa Barbara, USA, July 14-18, 2008
- “Dynamics of magnetized spherical accretion flows” solicited talk and paper in AIP proceedings, “Astrophysics of compact objects,” HuangShan, China, July 1-7, 2007
- “Some new semi-analytical approaches to axially symmetric hydrodynamic flows” talk at “Scientific conference”, MIPT, section of “Problems of physics and astrophysics,” November 26-27, 2005
- “Region of anomalous compression in Bondi-Hoyle accretion” poster at “Physics of Neutron stars,” St. Petersburg, Russia, June 27-29, 2005