

# Anna Varentsova, Ph.D.

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## EDUCATION

<b>PhD Physics</b> Illinois Institute of Technology, Chicago, IL Thesis: Development of a High Angular Resolution Diffusion Imaging Template and a Probabilistic Tract-Based Human Brain Atlas Advisor: Konstantinos Arfanakis, PhD	<b>2011-2015</b>
<b>MS Physics</b> Illinois Institute of Technology, Chicago, IL	<b>2009-2011</b>
<b>BS Physics, Minor in Business Administration</b> Nizhny Novgorod State University, Russia Thesis: Effects of synchronization and depletion of oscillations in a neuro-glial network. Advisor: Victor Kazantsev, PhD	<b>2005-2009</b>

## PROFESSIONAL HISTORY

2015-Present	<b>Postdoctoral Fellow</b> , Feinberg School of Medicine, Northwestern University, Chicago, IL Applying tract-based spatial statistics approach and network analysis to diffusion MRI data. Serving as a peer reviewer and mentor to students, contributing to the grant-writing efforts.
2010-2015	<b>Research Assistant</b> , Medical Imaging Research Center, Illinois Institute of Technology, Chicago, IL Developing and testing new image processing techniques. Includes work on large-scale analysis of neuroimaging data. Serving as a peer reviewer, contributing to the grant-writing efforts. <b>Research projects:</b> <b>Probabilistic mapping of the human brain connectivity (2013-2015)</b> <ul style="list-style-type: none"><li>• Analysis of human brain connectivity.</li><li>• Evaluation of currently existing network analysis metrics.</li></ul> <b>Development of the probabilistic white matter atlas of the human brain (2012-2015)</b> <ul style="list-style-type: none"><li>• Application of probabilistic tractography methods to the High Angular Resolution Diffusion Imaging (HARDI) template.</li><li>• White matter segmentation based on the connectivity patterns.</li><li>• Connectivity-based segmentation of thalamus and corpus callosum.</li><li>• Segmentation of the major fiber bundles based on the two-ROI approach.</li></ul> <b>High Angular Resolution Diffusion Imaging (HARDI) template of the human brain (2010-2013)</b> <ul style="list-style-type: none"><li>• Development of the in-house software for HARDI processing for datasets with voxel-dependent diffusion gradient orientation.</li><li>• HARDI template development.</li></ul> <b>Development of HARDI dataset from Coregistered non-HARDI datasets (2010-2011)</b> <ul style="list-style-type: none"><li>• Development of the method to generate a single high angular resolution dataset from a cohort of coregistered non-HARDI datasets.</li><li>• Assessing sampling density of non-uniform diffusion sampling schemes</li></ul>

- 2009-2010      **Teaching Assistant**, Department of Physics, Illinois Institute of Technology, Chicago, IL  
Training and monitoring students' performance for undergraduate level General Physics courses. Performing duties of a laboratory instructor.
- 2008-2009      **Project Assistant**, Innovation and Technology Center, Nizhny Novgorod, Russia  
Reviewing regulatory documentation and presenting findings to the team members at biweekly meetings. Preparing presentations for the clients. Supporting the Project Manager by facilitating project logistics, coordination and integration of the activities.
- 2007-2009      **Research Assistant**, Department of Neuroscience, Institute of Applied Physics of the Russian Academy of Science, Nizhny Novgorod, Russia  
Applying methods of non-linear system analysis to neuroscience models. Modeling a structure of coupled glial cells and evaluating stability of the ground states of the network using phase plane analysis. Researching the role of various neurotransmitters in the process of synchronization and depletion of oscillations in the system of coupled glial cells (astrocytes).

## HONORS AND AWARDS

### Scientific and academic awards:

- 2015      Merit Abstract Award from The Organization for Human Brain Mapping (OHBM)
- 2015      Summa Cum Laude Abstract Merit Award from the International Society for Magnetic Resonance in Medicine (ISMRM)
- 2015      Educational Stipend from the International Society for Magnetic Resonance in Medicine (ISMRM)
- 2014      Educational Stipend from the International Society for Magnetic Resonance in Medicine (ISMRM)
- 2013      Educational Stipend from the International Society for Magnetic Resonance in Medicine (ISMRM)
- 2013      Member of Physics Honor Society Sigma Pi Sigma
- 2011      Finalist of the student poster competition, White Matter Study Group, International Society for Magnetic Resonance in Medicine, (ISMRM)
- 2011      Educational Stipend from the International Society for Magnetic Resonance in Medicine (ISMRM)
- 2009      Dean's scholarship, Illinois Institute of Technology
- 2009      Best Presentation Award on the Annual Conference of Physics Students, Nizhny Novgorod, Russia
- 2009      Award for Excellence in Scholarship in the Sciences and Engineering from Institute of Applied Physics, Russian Academy of Science
- 2008      Award for Excellence in Scholarship in the Sciences and Engineering from Institute of Applied Physics, Russian Academy of Science
- 2006-2009      Dean's List, Nizhny Novgorod State University, Russia

### Leadership awards:

- 2013      Clinton Stryker Service and Leadership Award, Illinois Institute of Technology
- 2013      Led the team to the Best Collegiate Society of Women Engineers Section in Chicago region award

## PUBLICATIONS

### Peer-reviewed Journal Articles:

- J1.      **Varentsova A**, Zhang S, Shanina E, Arfanakis K. Connectivity-based Parcellation of White Matter in IIT Human Brain Atlas using HARDI Tractography, (in preparation *Neuroimage*).
- J2.      **Varentsova A**, Zhang S, Arfanakis K. Development of high angular resolution diffusion imaging human brain template, *Neuroimage*, 2014; 91: 177-186 (Impact factor: 6.132, Citation count: 14).

- J3. Arfanakis K, Fleischman DA, Grisot G, Barth CM, **Varentsova A**, Morris MC, Barnes LL, Bennett DA. Systemic inflammation in non-demented elderly human subjects: brain microstructure and cognition, *PLoS ONE*, 2013; 8(8): e73107 (Impact factor: 3.534, Citation count: 16).

#### **Peer-Reviewed Abstracts-Proceedings:**

- P1. **Varentsova A**, Shanina E, Arfanakis K, Connectivity-based Parcellation of White Matter in IIT Human Brain Atlas using HARDI Tractography (OHBM) 2015, Honolulu, HI, USA.
- P2. **Varentsova A**, Zhang S, Shanina E, Arfanakis K, Connectivity-based atlas of human brain white matter in ICBM-152 space (ISMRM) 2015, Toronto, Canada.
- P3. **Varentsova A**, Zhang S, Arfanakis K, Atlas of Human Brain Gray Matter Connectivity, Proceedings Radiological Society of Northern America (RSNA) 2014, Chicago, IL, USA.
- P4. **Varentsova A**, Zhang S, Arfanakis K, Probabilistic mapping of brain connectivity in the IIT Human Brain Atlas, Proceedings International Society for Magnetic Resonance in Medicine (ISMRM) 2014, Milan, Italy.
- P5. **Varentsova A**, Zhang S, Arfanakis K, Probabilistic Atlas of the Adult Human Brain White Matter, Proceedings International Society for Magnetic Resonance in Medicine (ISMRM) 2013, Salt Lake City, UT, USA.
- P6. **Varentsova A**, Zhang S, Arfanakis K, Probabilistic Tract-based Atlas of the Adult Human Brain White Matter, Proceedings Radiological Society of Northern America (RSNA) 2012, Chicago, IL, USA.
- P7. **Varentsova A**, Zhang S, Arfanakis K, A Template of the Micro-Architecture of the Human Brain, Proceedings Radiological Society of Northern America (RSNA) 2011, Chicago, IL, USA.
- P8. **Varentsova A**, Zhang S, Arfanakis K, Development of an Average Human Brain High Angular Resolution Diffusion Imaging Template, Proceedings American Society of Neuroradiology (ASNR) 2011, Seattle, WA, USA.
- P9. **Varentsova A**, Zhang S, Arfanakis K, A High Angular Resolution Diffusion Imaging Template of the Human Brain, Proceedings International Society for Magnetic Resonance in Medicine (ISMRM) 2011, Montreal, Canada.

#### **SKILLS**

Programming Languages: MATLAB, R  
Neuroimaging Tools: FSL, FreeSurfer, MRtrix, ImageJ, Tortoise, ITK-SNAP  
Operating Systems: Mac OS, Linux, Windows

#### **RESEARCH SUPPORT**

- 2015-Present Dr. Lei Wang's grant from National Institute of Nursing Research (NINR) (R01NR014182-01)
- 2015-Present Dr. Greg Miller's grant from National Heart, Lung, & Blood Institute (NHLBI) (R01HL122328)
- 2012-2015 Dr. Konstantinos Arfanakis' grant from National Institute of Biomedical Imaging and Bioengineering (NIBIB) (R21EB006525).
- 2010-2011 Dr. Konstantinos Arfanakis' grant from National Institute of Neurological Disorders and Stroke (NINDS) (R21NS076827).

## INVITED TALKS

- “Development of a High Angular Resolution Diffusion Imaging (HARDI) Template and Probabilistic Connectivity-Based Atlas of the Human Brain”, Cognitive Brain Mapping Group, Feinberg School of Medicine, Northwestern University, Chicago, IL, 2015.
- “Dual Tensor Atlas Registration Based on a Cohort of Coregistered non-HARDI Datasets”, paper review, Medical Imaging Research Center, Illinois Institute of Technology, Chicago, IL, 2014.
- “Exploring connectivity of the human brain”, Physics Department preview day, Chicago, IL, 2013.
- “Diffusion MRI: from diffusion tensor model to high angular resolution diffusion imaging”, Physics Department preview day, Chicago, IL, 2012.
- “A High Angular Resolution Diffusion Imaging Template of the Human Brain”, International Society for Magnetic Resonance in Medicine poster competition final, Montreal, Canada, 2011.

## SERVICE

- 2016           **Abstract Reviewer**, Organization for Human Brain Mapping
- 2015-Present   **Ad-hoc Reviewer**, Neuroimage
- 2015-Present   **Student Mentor**, Department of Psychiatry, Northwestern University, Chicago, IL
- Training graduate students in diffusion MR imaging processing techniques.
- 2014-2015      **Student Mentor**, Department of Biomedical Engineering, Illinois Institute of Technology, Chicago, IL
- Trained undergraduate and graduate students in MR imaging post-processing techniques for assessing cortical network organization.
- 2014, 2015      **Volunteer**, National Academy of Engineering
- Served as a judge for the Engineer Girl essay contest.
- 2012-2013      **President**, Illinois Institute of Technology Chapter, Society of Women Engineers, Chicago, IL
- Doubled member engagement within a few months.
  - Repeatedly raised funds (total over \$20K) by developing partnerships with independent sponsors and in-school organizations.
  - Led the team to the Best Collegiate Section in Chicago region award.

## PROFESSIONAL ORGANIZATIONS

- 2011 – Present      Radiological Society of North America (RSNA).
- 2011 – Present      International Society for Magnetic Resonance in Medicine (ISMRM).
- 2012 – Present      Society of Women Engineers (SWE).
- 2013 – Present      Physics Honor Society (Sigma Pi Sigma).
- 2015 – Present      Organization for Human Brain Mapping (OHBM).