The holographic glass bead game : from superconductivity to time machines

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List of Publications

The thesis is based on the following publications:

1. I. Y. Arefeva, A. A. Bagrov and E. O. Pozdeeva, "Holographic phase diagram of quark-gluon plasma formed in heavy-ions collisions," JHEP **1205** (2012) 117 [arXiv:1201.6542 [hep-th]].

2. A. Bagrov, B. Meszena and K. Schalm, "Pairing induced superconductivity in holography," JHEP **1409** (2014) 106 [arXiv:1403.3699 [hep-th]].

3. I. Arefeva, A. Bagrov, P. Säterskog and K. Schalm, "Holographic dual of a time machine," [arXiv:1508.04440 [hep-th]].

Other publications by the author are

4. I. Y. Arefeva, A. A. Bagrov and E. A. Guseva, "Critical Formation of Trapped Surfaces in the Collision of Non-expanding Gravitational Shock Waves in de Sitter Space-Time," JHEP **0912** (2009) 009 [arXiv:0905.1087 [hep-th]].

5. I. Y. Arefeva, A. A. Bagrov and L. V. Joukovskaya, "Critical Trapped Surfaces Formation in the Collision of Ultrarelativistic Charges in (A)dS," JHEP **1003** (2010) 002 [arXiv:0909.1294 [hep-th]].

6. I. Arefeva, A. Bagrov and A. S. Koshelev, "Holographic Thermalization from Kerr-AdS," JHEP **1307** (2013) 170 [arXiv:1305.3267 [hep-th]].

7. A. A. Bagrov, "Time machine creation in the ultra-relativistic proton collisions," Nucl. Phys. Proc. Suppl. **216** (2011) 211.

8. I. Y. Arefeva, A. A. Bagrov and L. V. Joukovskaya, "Several aspects of applying distributions to analysis of gravitational shock waves in general relativity," St. Petersburg Math. J. **22** (2011) 3, 337.

Curriculum Vitæ

I was born on 18 July 1987 in Zheleznodorozhny, a city in the Moscow Region in Russia. In 2003 I became a student at the Faculty of Physics of Moscow State University, and graduated in 2009 with a master degree *summa cum laude* from the department of quantum theory and high energy physics. Title of my master thesis was "Astrophysical sources of electromagnetic radiation as possible sources of gravitational waves". In parallel, since the fall of 2005 I attended courses on modern mathematics and mathematical physics at the Steklov Mathematical Institute of the Russian Academy of Sciences.

In 2009 I enrolled a graduate program at the Steklov Institute. After spending the next two years as a PhD student there working on the theory of trans-Planckian collisions under supervision of Prof. Irina Arefeva, I became more interested in low energy physics and transferred to Leiden, the Netherlands, in September 2011 to do PhD research with Prof. Jan Zaanen and Prof. Koenraad Schalm on applications of the AdS/CFT correspondence to condensed matter physics at the Lorentz Institute for Theoretical Physics.

While in Leiden, I was a tutor for the courses on General Relativity and condensed matter theory.

During my study in Moscow and Leiden I have attended a number of schools and conferences in Russia, the Netherlands, Germany, Czech Republic, Switzerland, France, the United Kingdom, Greece, China, Austria, Iceland, and Sweden.

After graduation with a PhD degree, I will continue my academic career as a postdoctoral researcher at the Radboud University in Nijmegen, the Netherlands, with Prof. Mikhail Katsnelson.

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Professional development of myself as a scientist would have been impossible without the endless, decade-long discussions with my father Alexander on the philosophy and methodology of science, and without the enormous amounts of care and understanding from my mother Valentina. Anastasia, my dear sister, I put a very high value on our friendship.

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