## Main field of study: 011200 Physics

Area of specialization: Physical Optics and Lasers

Department of Optics

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**Investigation of the basic characteristics of a short (without a positive column) glow discharge in helium.**

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This work helps to fill some gaps in the study of short-glow discharge from the point of view of the experiment, and from the point of view of the theory. For example, there was no systematic probe measurements of a short glow discharge, in the literature theoretical models are consistent with the experimental data only qualitatively (in order of magnitude). Tasks:

* Measurement of current-voltage characteristics (CVC) of a short glow discharge and its diagnostics by probes;
* Comparison and analysis of the results of theoretical consideration, the experimental results and modeling short glow discharge.

Since we are interested in the spatial distribution of parameters, diagnostic probe method was chosen as the primary. During the work on the thesis was conducted the following scope of work:

* The discharge tube was made
* The technique of measuring the CVC of discharge and probe curves were worked out. The parameters of the plasma and their spatial distribution were defined.
* A comparison with the results of theoretical calculations were performed. A satisfactory agreement between the results was obtained
* Experimentally confirmed the fact of the low value of the electron temperature in the plasma glow discharge short.
* Based on experimental measurements refinement interpretation of current-voltage characteristics of a short discharge was given.
* Method of probe diagnostics for parietal electrode was tested.

# The list of the publications:

1. А.Б. Астафьев, К.А. Барзилович, С.А. Гуцев, Р.Ю. Замчий, А.А. Кудрявцев.

Исследование параметров короткого (без положительного столба) тлеющего разряда в гелии с нелокальной плазмой. Тезисы докладов XLI Международной (Звенигородской) конференции по физике плазмы и УТС. Г.Звенигород, 10-14 февраля 2014 г. М., ЗАО НТЦ «ПЛАЗМАИОФАН», с.200, 2014. [http://www.fpl.gpi.ru/zvenigorod/xli/news.html](http://www.fpl.gpi.ru/Zvenigorod/XLI/news.html)

1. K. Barzilovich, S. Gutsev, A. Kudryavtsev, A. Saufutdinov, R. Zamchiy. Characteristics of nonlocal plasma source for the analysis of gases by the method of collision electron spectroscopy (CES). The Program of the First International Plasma Technologies Congress (PLASMATECH 2014), April 28-30, 2014 in Abdullah Gül University, Kayseri, Turkey. <http://plasmacongress.org/program/>
2. А.А. Кудрявцев, К.А. Барзилович, С.А. Гуцев, Р.Ю. Замчий, С.С. Сысоев. Исследование параметров короткого тлеющего разряда в гелии. Сборник Материалов Всероссийской (с международным участием) конференции "Физика низкотемпературной плазмы" (ФНТП - 2014), Казань, 20 - 23 мая 2014. Казань, издательство КНИТУ.Том 1, с.88-91. 2014.
3. S.A. Gutsev, A.A. Kudryavtsev, R.Yu. Zamchiy, V.I. Demidov, V.I. Kolobov. Diagnostics and modeling of a short (without positive column) glow discharge in helium with nonlocal plasma. Proceedings of the 40th European Physical Society Conference on Plasma Physics. Finland, July 1st - 5th 2013. 06.502. <http://eps2013.aalto.fi/?page=diagnosticsMeeting>
4. V. Demidov, A. Astafiev, S. Gutsev, A.Kudryavtsev, R.Zamchiy. Diagnostics of a nonlocal plasma of a short glow discharge with active boundaries. 55th Annual Meeting of the APS Division of Plasma Physics, November 11-15, 2013; Denver, Colorado, USA. Session UP8: Abstract: UP8.116. Bulletin of American Physics Sosiety, v.58, N16, p., 2013. <http://meetings.aps.org/Meeting/DPP13/Event/201522>
5. К.А. Барзилович, Д.Б. Бельский, С.А. Гуцев, Р.Ю. Замчий. Исследование параметров короткого тлеющего разряда гелия. //Вестник СПбГУ. 2014. (в печати).