STATEMENT REPORT

by professor PhD **Nikolai Lazarov Manev**
The Institute of Mathematics and Informatics – BAS
Professional field 4.5 Mathematics
on the dissertation thesis for acquiring "**Ph. D. degree**"
in **4.6 Informatics and Computer Sciences**
of **Nevyana Dimitrova Georgieva**

Title of the thesis**: "Network Coding and Analogues of Designs"**

Scientific Adviser: **Professor D.Sc. Ivan Landjev**

1. General description of the procedure and the applicant

Nevyana Georgieva was born in 1985. She received Bachelor degree in 2009 and MS degree with subject "Probability and Statistics" in 2012, both at the Faculty of Mathematics and Informatics of the Sofia University "St. Kliment Ohridski". Nevyana Georgieva started her PhD study (PhD program "Informatics") in the end of 2012 and successfully completed her education in the July 2017. Since 2009 she has work as an assistant professor (part or full time) at the department "Geometry" of the Faculty of Mathematics and Informatics of the Sofia University "St. Kliment Ohridski

By order № 3-РК-233 / 05.05.2022 the Rector of the New Bulgarian University (NBU) appointed me as a member of the Scientific Jury. In such a capacity I received all required documents (in digital form) that concern the procedure. The documents show that the applicant fully meets the minimal national requirements according to the Act on Development of the Academic Staff in the Republic of Bulgaria.

2. Approbation of the results in the dissertation

The results presented in the dissertation have been published in 3 papers, 2 of them with coauthor prof. Landjev. One paper has impact factor and one (in Ann. Sofia Univ.) is indexed by MathSciNet and zbMATH.
The papers have not been used for acquiring other degree or for occupying positions.

3. Assessment of the personal contribution of the applicant in joint works

According declaration of the coauthor and my personal observations I can conclude that the personal contribution of Nevyana Georgieva to joint papers is equipollent.

4. Impact of the results on the work of other scientists

Nevyana Georgieva does not present any information about citations of her papers but the Act on Development of the Academic Staff in the Republic of Bulgaria does not require the existence of citations.

5. Quality of the dissertation Abstract

The Abstract contains 15 pages and presents correctly the content of the chapters and the spirit of the dissertation as a whole. It underlines also the main results obtained in the thesis.

6. Description and analysis of results in the thesis

The dissertation thesis contains 78 pages and consists of Introduction (Chapter 1), three chapters and Bibliography with 85 titles. The Nevyana Georgieva's publications concerning the thesis are listed at the end of Introduction as well as into the Abstract.

Chapter 2 introduce the numerous notions and facts necessary for reading and understanding the rest of the thesis. The author's original results are given in Chapters 3 and 4.

The thesis addresses the problem of existence of designs in projective coordinated geometries over finite chain rings. Such geometries are called geometries of Hjelmslev. The addressed purely theoretical problem is closely tight with applied theories as coding theory and network coding in partial. The thesis can be considered as a contribution to construction of optimal network codes.

Chapter 3 studies the existence and uniqueness of the standard form of matrix that generates module over finite chain ring. A detailed description of the developed algorithms and tools for manipulations of modules over finite chain rings is also given in this chapter.

The last chapter of the thesis is devoted to obtaining necessary and sufficient conditions for existence of spreads of projective Hjelmslev geometries.

According to Nevyana Georgieva her scientific contributions are five and they are listed on the page 9 of the Abstract. Contributions with numbers 4 and 5 in this list are the result obtained in Chapter 4 and they are published in the Designs, Codes and Cryptography, 87(2019), 785-794. Contributions with numbers 1 and 2 are obtained in Chapter 3. They are published in the Ann. Sofia Univ., Fac. Math. and Inf., 104 (2017), 89–98. The detailed description of the contribution 3 is the content of the paper in Serdica J. Computing 10(2016), No. 3-4, 285–297.

In my opinion Nevyana Georgieva correctly points her contributions and they are solutions of difficult and interesting problems.

7. Critical remarks

I have no essential critical remarks.

CONCLUSION

The dissertation thesis of Nevyana Georgieva contains theoretical results that are original contribution to the studied mathematical area. The thesis fully meets the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its application. Nevyana Georgieva **demonstrates qualities and abilities for carrying out self-depended investigations.**

Based on the aforesaid in this report **I give positive estimation of the considered dissertation and strongly recommend the Scientific Jury to confer on Nevyana Dimitrova Georgieva the educational and scientific degree "Doctor"** in **area of higher education: 4. Natural Sciences, Mathematics and Informatics**, **professional field: 4.6 Informatics and Computer Sciences**

03.06.2022 г. Signature:

Sofia Prof. N. L. Manev