

I. IDENTIFICATION DATA

Title:	Generalized uncertainty relation and its use in cosmology
Author's name:	Jan Masák
Type of assignment:	Bachelor Project
Faculty:	Faculty of Nuclear Sciences and Physical Engineering (FNSPE)
Department:	Department of Physics (DP)
Reviewer:	Professor Salvatore Mignemi
Reviewer's affiliation:	Department of Mathematics, Università di Cagliari

II. ASSESSMENT OF CRITERIA

Work assignment	demanding
<i>Assess how demanding the work topic is.</i>	
I find the work assignment quite demanding, since it requires a good knowledge of analytical mechanics, quantum mechanics and general relativity, and notions of quantum field theory in curved spaces, noncommutative geometry, etc.	

Fulfilling the assignment	fulfilled
<i>Consider whether the work submitted meets the assignment. If necessary, give your comments on items of the assignment not fully answered, or judge whether the scope of the assignment has been broadened. If student failed to fully treat the assignment, try to assess the importance, impact and/or the reasons for the failings.</i>	
To my knowledge, the work submitted fully meets the assignment.	

Chosen approach to solution	appropriate
<i>Assess whether student applied a correct approach or method of solution.</i>	
The methods used in this thesis are correct.	

Professional standard	excellent
<i>Assess the professional standard of the work, application of course knowledge, references, and data from practice.</i>	
The professional standard of this dissertation is high.	

Level of formality and of the language used	excellent
<i>Assess the use of scientific formalism, the typography and language of the work.</i>	
The work adopts the standard scientific formalism and typography. The English is good, except some minor typos.	

Choice of references, citation correctness	excellent
<i>Assess student's effort in finding and using study sources for completing their work. Give characteristics of the references chosen. Assess whether student made use of all the relevant sources. Verify whether all items used are properly distinguished from the results obtained by student and their deliberations, whether there are no violations of citation ethics, and whether the bibliography presented is complete and complies with the citation usage and standards.</i>	
The bibliography is abundant and sufficiently complete, considering that the literature on the subject is rather vast. All the citation refer to advanced literature and are properly acknowledged.	
Only a few references, important for the discussion, have been overlooked. I report the details here, since they can be useful to the student if he wishes to pursue his research on this topic:	
The existence of a minimal length in gravitational theories was first discussed by C.A Mead, Phys. Rev. 135, B849 (1964) and Phys. Rev. 143, 990 (1966).	
The first derivation of Snyder algebra from constrained Hamiltonian dynamics is to my knowledge G. Jaroszkiewicz, J. Phys. A 28, L343 (1995).	

The problem of geodesics in Schwarzschild metric with Snyder dynamics has previously been considered from a different point of view in

S. Mignemi and R. Strajn, Phys. Rev. D90, 044019 (2014).

A weak point of the thesis is that the student did not stress sufficiently what his contributions are.

Further comments and assessment

Give your opinion on the quality of the main results obtained in the work, e.g. the theoretical results, or the applicability of the engineering or programming solutions obtained, publication outputs, experimental skills, and the like.

Although most results reported in the thesis are not original, the exposition is correct and very clear.

It seems that no publications have resulted from this work, which is however normal for a Bachelor thesis.

III. OVERALL ASSESSMENT, QUESTIONS TO BE ASKED DURING THE WORK DEFENCE, SUGGESTED GRADE

Summarize those aspects of the work that were significantly influential for your overall assessment. Suggest questions to be answered by student during the defence of the work before the examination board.

In my opinion, the thesis contains an excellent review of the generalized uncertainty principle, starting from its motivations, till more technical aspects and the discussion of some of its consequences. In particular, its connection with the Snyder model is thoroughly discussed.

I would suggest to ask the student to stress what are his original contributions to the problem, since this does not emerge clearly from his dissertation.

Suggested grade: **A - excellent.**

Date: 22/08/2023

Signature:

