

**I. IDENTIFICATION DATA**

<b>Title:</b>	<b>Pokročilé metody dekompozice radiačního pole hybridními pixelovými detektory (Advanced Methodology for Radiation Field Decomposition with Hybrid Pixel Detectors)</b>
<b>Author's name:</b>	<b>Bc. Declan Garvey</b>
<b>Type of assignment:</b>	Master Thesis
<b>Faculty:</b>	Faculty of Nuclear Sciences and Physical Engineering (FNSPE)
<b>Department:</b>	Department of Physical Electronics
<b>Supervisor:</b>	Dr. Benedikt Bergmann
<b>Supervisor's affiliation:</b>	Institute of Experimental and Applied Physics, CTU in Prague

**II. ASSESSMENT OF CRITERIA**

<b>Work assignment and topic motivation</b>	<b>demanding</b>
<i>Assess how demanding the assigned topic is. Brief introductory word on motivation for choosing the topic.</i>	
The aim of the work was the improvement of current analysis techniques for detectors of Timepix3 technology (hybrid pixel detectors). Therefore, it was necessary to get familiar with ionizing radiation interactions in matter, ionizing radiation detection, methods for separation of different types of particles, currently available analysis methodology, and simulation techniques. The student had to define innovative approaches going beyond the state of the art, validate the methods and apply them to data taken in the MoEDAL experiment (at LHC) and in space. The assignment can be regarded as challenging for a master thesis and has led to publishable results.	

<b>Fulfilling the assignment</b>	<b>fulfilled</b>
<i>Consider whether the work submitted meets the assignment topic. Comment, if necessary, on items of the assignment not fully answered, or mention whether the scope of the assignment has been broadened. If student failed to fully treat the assigned topic, try to assess the importance, impact and/or the reasons for failings.</i>	
The assigned tasks of the thesis were fulfilled.	

<b>Student's effort and independent approach to the topic solution</b>	<b>excellent</b>
<i>Assess whether student displayed constant effort while investigating the problem, whether they regularly consulted the issues and whether they attended consultations well prepared. Assess student's creativity and independence.</i>	
Declan Garvey has shown great interest in the topic. He has been working with a large intrinsic motivation, self-reliantly and with excellent time management. He was coming up with new ideas, solving most of the difficulties experienced during the course of the thesis work, himself. He was able to anticipate possible bottlenecks in the analysis, so that he could proactively initiate consultation.	

<b>Professional standard</b>	<b>excellent</b>
<i>Give your opinion on the professional standard of the work, application of course knowledge, references, and data from student's practice.</i>	
The work was the continuation of the previously defined research project. The achieved results are beyond the anticipated output of the assignment. The student has identified relevant published works, which are correctly cited.	

<b>Level of formality and of the language used</b>	<b>excellent</b>
<i>Assess the use of scientific formalism, the typography and language of the work.</i>	
The result presentation is on a high scientific level. The thesis is very well written.	

<b>Choice of references, citation correctness</b>	<b>excellent</b>
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*Give your opinion on student's effort in utilizing references in their investigation. Characterize the choice of references and say whether all relevant sources were utilized. Verify whether all resource facts were properly distinguished from student's own findings and results, whether there was no breach of citation ethics, and whether all reference citations are complete and agree with the citation usage and standards.*

Declan Garvey has carefully studied relevant publications. It is clearly stated how the presented work builds on the state of the art. The bibliographic data is complete.

### **Further comments and assessment**

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

The relevance and the impact of his work is demonstrated by the fact that even intermediated results have contributed to publications. The results achieved by applying the developed applications to real-world problems lead to novel results, e.g. a first measurement of the proton energy spectrum in Low Earth Orbit with SATRAM (Space Application of Timepix Radiation Monitor) and the impressive view on the interaction point in MoEDAL, which both deserve timely publication!

### **III. OVERALL ASSESSMENT AND SUGGESTED GRADE**

*Summarize all aspects of the work most influential for the overall assessment. If adequate, write questions to be answered by student during the defence of their work before the board.*

Declan Garvey has demonstrated that he is not only capable of doing high quality scientific work, but also of doing it independently. The student's efforts, his work ethics, achieved results and their presentation are excellent.

Suggested grade: **A - excellent.**

Date: 28.5.2023

Signature:

