THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Wireless radiation monitoring system for particle accelerators**
Author's name:	**Martin Cejp**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Measurement
Thesis reviewer:	Ing. Tomáš Dresler
Reviewer's department:	STMicroelectronics Design and Application s.r.o.

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**

How demanding was the assigned project?

The thesis targets the physical aspects of radiation measurement and the task is to develop embedded SW with respect to several requirements: the wireless data transmission and the low-power mode of operation due to battery supply on previously developed project BatMon, and the data collection and presentation.
The Covid-19 risk increased the difficulty to access the facility and to continue the thesis development.

Fulfilment of assignment	**fulfilled**

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

All tasks prescribed in the thesis objectives were fulfilled, some even exceeded the expectancy (battery lifetime, radiation dose reliability).

Methodology	**correct**

Comment on the correctness of the approach and/or the solution methods.

The project uses existing platform BatMon, that the student extended by developing further daughterboards (RAM sensors, break-out board, battery board). The software was built on 3rd-party libraries (HAL, low-level peripheral drivers, LoRa stack LMIC) where Mr. Cejp added further code to guarantee reliable low-power operation and communication over the LoRa stack. The evolution of existing platform required to adapt to HW and SW style of previous authors, which Mr. Cejp achieved very well.

Technical level	**A - excellent.**

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

The thesis shows author's excellent knowledge of the topics, counting LoRa, physics of the irradiation of different sensors, programming of microcontrollers and usage of the time-series databases and visualization tools. The work is described in logical steps and the thesis explains the whole process and reasoning.
Additional sources (schematics, source code) were provided and I found them well organized. I appreciate the design of the SW with test modes.

Formal and language level, scope of thesis	**A - excellent.**

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The thesis is organized in logical blocks, well structured and presented. The grammar and style are clear of mistakes and very well understandable. The work has adequate length, all required parts clearly explained.

Selection of sources, citation correctness	A - excellent.
Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?	
The thesis refers to previous sources (esp. because it is based on them) often and is clearly distinguished from them, so the reader recognizes original addendum to the previous work. The literature referred in the text is well formatted and the list of the sources is comprehensive and listed according to the citation criteria.	

Additional commentary and evaluation (optional)
Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.
The thesis enhances previous works and brings the radiation monitor to the stage of several working prototypes with full configurability and operability ready for long-term testing of various sensors. It proved LoRa as reliable transmission means and pointed out its benefits and drawbacks. The back-end for the generated data is mentioned as well and it's up-to-date for given task and amount of data.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

The thesis was presented personally by Mr. Cejp. He proved knowledge of the whole particle accelerator system, the physics behind the radiation detection, reliability and detection characteristics of the sensors, the operation of the RadMon in all aspects (HW, SW, operation of the ATMEL SAMD peripherals, communication with external memories, the protocols, usage of bit-flip detection algorithms and risk of damage to various parts of the system). The practical measurements in the irradiation facility were collected and presented in concise manner, with knowledge about many aspects and limitations.

The questions for the author:

1. Does CERN use formalized methodology for code testing, i.e. MISRA?
2. Is there some formal requirement for code documentation, i.e. usage of Doxygen?
3. Is the SRAM sensor more sensitive to gamma or neutron irradiation?

The grade that I award for the thesis is **A - excellent.**

Date: **30.8.2020**   Signature: