

<b>Title of thesis:</b>	<b>Laser-driven ion acceleration: analysis and theoretical interpretation of experimental data</b>
<b>Author of thesis:</b>	<b>Bc. Arsenios Hadjikyriacou</b>
<b>Type of work:</b>	Master's thesis
<b>Faculty:</b>	Faculty of Nuclear Sciences and Physical Engineering, CTU in Prague
<b>Department:</b>	Department of Physical Electronics
<b>Opponent of thesis:</b>	Ing. Jakub Cikhardt, Ph.D., Faculty of Electrical Engineering, CTU in Prague

The master's thesis is aimed at the experimental and theoretical study of laser-driven ion acceleration at the state-of-the-art laser in infrastructure ELI in Dolní Břežany which is commissioning nowadays. At the first sight, the thesis is neatly worked out with attractive images and an overall high-quality design. The text is written clearly in very good English. In an accordance with the tasks of the thesis, the first chapter is composed of a theoretical background which is important for the study of laser-driven ion acceleration. In this chapter, the student is not running into excessive details but the physical principles essential for this work are described in an adequate scope, that I appreciate. Chapter 2 is aimed at the introduction to the PIC methods that have been used for the theoretical interpretation of the experimental data in the frame of the reviewed work. Chapter 3 is devoted to the second task of the thesis – a brief overview of the ELIMAIA facility. The overview includes a description of the experimental hall and diagnostic methods used in the experiment considered in the reviewed thesis. The description is accurate and supported by original images. The third task of the thesis – analysis of the experimental data and the fourth task – interpretation of the results by PIC simulation are worked out in chapter 4. This chapter I consider the most important since it contains the student's original work. At the same time, it presents one of the first results from laser-plasma experiments on the ELI laser facility. Maybe, section 4.1 High-Rep-Rate Advanced PW Laser Systems would better fit in the previous chapter with the description of ELIMAIA but it does not change the high quality of the thesis. As far as the bibliography is concerned, it includes 69 references, mostly papers in prestigious peer-reviewed journals.

The formal aspects of the study: the design, typography, and citations correspond with the conventions established for scientific works.

I consider that all tasks of the thesis have been completed with adequate scope, formal and technical level corresponding to the master's degree.

With respect to the exceptional care with which the thesis has been worked out and the topicality of the theme, I propose an evaluation of **A-excellent (A-výborně)**.

I would like to ask the student a few questions:

1. On page 32, there is mentioned: "EMP photopeak" which limits the detectable proton energy range. Could you describe such a phenomenon in more detail? Could be such a negative effect mitigated?
2. Figure 4.3 on page 43 displays laser focus with FWHM intensity on the area (2.9 x 1.8)  $\mu\text{m}$ . Was such an excellent focal spot reached using adaptive optics?
3. Please, what was your contribution/responsibilities in the experiments on ELIMAIA?

Date: 26.05.2022

Signature: