



UNIVERSITA' DEGLI STUDI DELL'INSUBRIA

Dipartimento di Scienza ed Alta Tecnologia

Via Valleggio, 11 - 22100 Como

Tel. 031-2386141 - Fax. 031-2386209

Como, 10th September 2017

TO WHOM IT MAY CONCERN

Review of the Doctoral Thesis titled

SILICON PHOTOMULTIPLIERS APPLIED FOR FLUORESCENCE DETECTION OF BIOMARKERS IN THE SYSTEM WITH SELF-CALIBRATED GAIN

presented by **Piotr Dorosz, M.Sc.**

The thesis submitted by the Candidate has a focus on instrumentation & methods for the detection of fluorescence light by samples of biological interest, notably cells in flow cytometry.

I do believe it is a thesis of high standing. What I did appreciate is the capability of the Candidate to face the different aspects of the performed activity, ranging from the essence of fluorescence to the understanding of the experimental boundary conditions, a pre-requisite for the design of the experiment, the detailed engineering phase, the commissioning and the qualification of the prototypes, the assessment of the different options. It is not common in a student to have a broad view of a topic and I honestly believe this shall be appreciated.

To be more specific, in purely electronics engineering terms the activity by the candidate proved his skills in analog and digital design and system integration, certainly an asset and his strongest point. In particular, I could appreciate his analysis of the Silicon Photomultiplier model, on the way to the optimal design of the front-end. Different options were compared and the final choice was very clearly motivated and turned into a circuit design. The implementation of a feedback method for gain stabilisation is also relevant and original, as confirmed by the papers having the Candidate as co-author.

The only minor point is possibly a slightly superficial analysis of the sensor in the initial Chapters but I do understand the need not to extend in excess the thesis. The bibliography is certainly complete and useful for the interested reader to learn more.

I have a series of minor questions and details I would be honoured to discuss during the defence but, to conclude my analysis, I would rank this thesis at very high level and I would have no doubts that the Candidate shall be awarded a Ph.D. Degree.

Best regards,

Massimo Caccia

Professor

Coordinator of the graduate school in Physics & Astrophysics

Dipartimento di Scienza ed Alta Tecnologia