

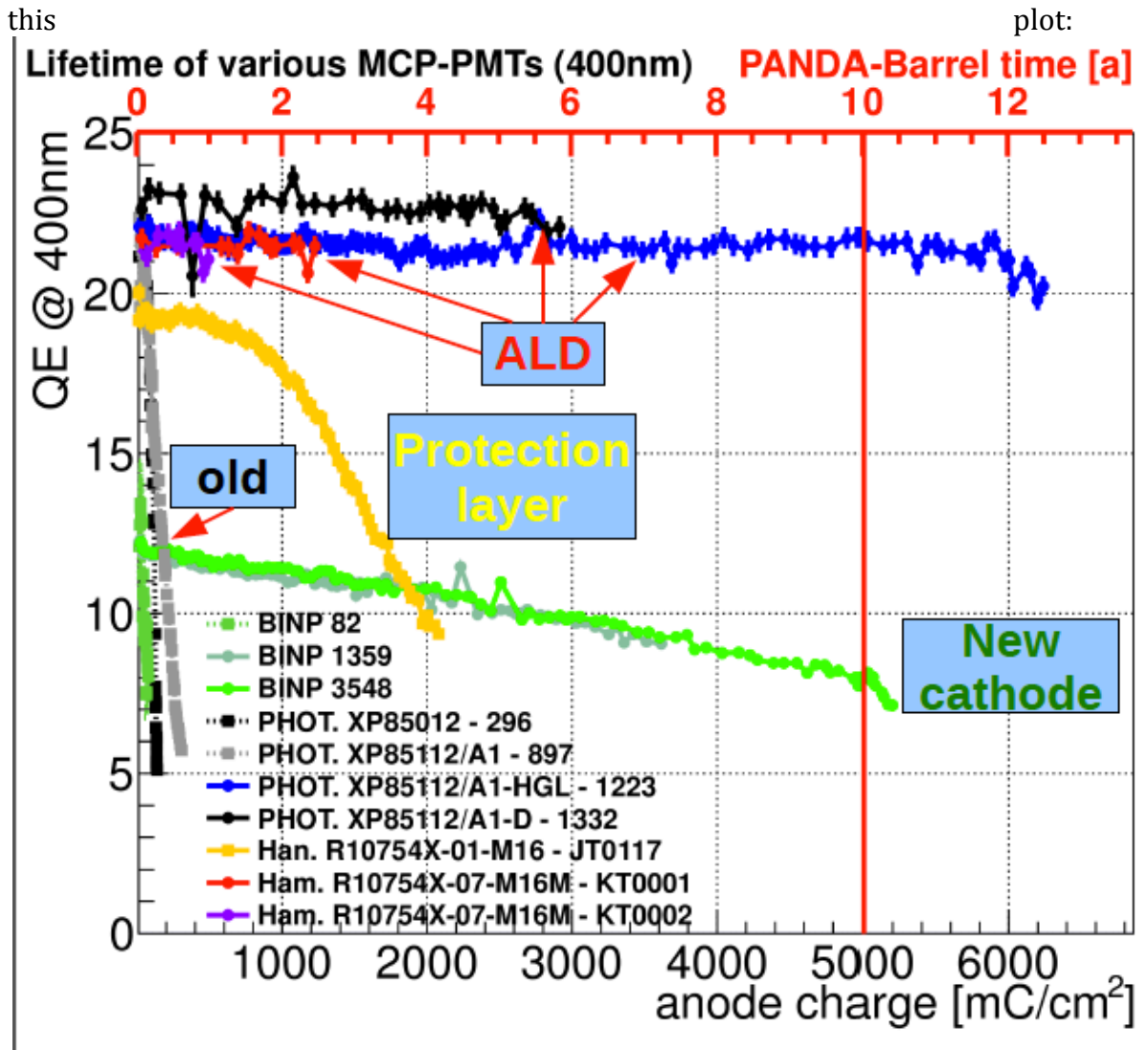
## CMS-TOTEM PPS project TDR

Reviewer comments by P. Lecoq

This is an excellent, very detailed and comprehensive document summarizing an impressive amount of work. Congratulations to the authors!

I don't come back to cosmetic changes such as correcting a few typos, missing references, incomplete acronym definitions, etc..., as this point has been already addressed in detail by Mirko. On the last point however I would suggest adding one page with a list of most unusual acronym definitions to help the reader having a short memory. Below is my list of comments/suggestions, the most important in my view being the last 3 ones:

- 1- section 5.1: when mentioning the use of NINO and HPTDC for Quartic and Gastof it could be useful to add that this approach offers not only an immediate solution because of the existence of these two well known chips but that it offers a potential for possible future upgrades as new improved versions of the HPTDC and of the NINO are already in the pipeline.
- 2- section 5.2.2: I am sure that the Quartic people are aware of this point but the fact that the Cerenkov angle is the complement of the critical angle for the propagation of the photons in the bar imposes severe constraints not only on the alignment of the bar vs the beam line (this point is addressed later in the TDR in section 5.2.6) but also on the surface state of the bar. In order to minimize light losses due to breaking the total reflection criteria the surface must be polished at a precision of at least  $\lambda/4$ , which has a cost. On this point I am surprised to see that wrapping the bars with a simple and very thin (25 microns would be enough) aluminized mylar foil does not seem to have been considered to avoid cross talk when maintaining the minimum gap between the bars and recuperate the light leaking by not perfect total reflection conditions.
- 3- Section 5.2.2. Table 10: This table would be easier to interpret if it was supported by a small sketch with a definition of x, y, R and L.
- 4- Section 5.3: I think that the recovery time of 100ns for the SPAD recharge is rather pessimistic, particularly after mentioning SPADs of 20 microns a few lines above. It depends of course of the SPAD dimensions but even for 50 micron SPADs, which is the likely dimension to be chosen at the end the recovery time is probably of the order of 50ns.
- 5- Section 5.2.8 or 5.3: about the improvements of MCP cathode lifetime in high rate environment with the ALD technique (Atomic Layer Deposition) you could show



- 6- Section 5.3, Fig. 74: The legend of this figure should better explain what is the difference between the left and right plots.
- 7- Section 5.4.2: As the TDR is an official document we have the obligation, when mentioning EndoTOFPET-US to put a footnote with the following sentence: *This project have been funded by the European Union 7th Framework Program (FP7/2007-2013) under Grant Agreement No. 256984 (EndoTOFPET-US)*
- 8- This is a more general comment. The TDR is aiming at convincing the funding agencies to inject money in this project. I think that the last section 7 is the most important one from this point of view and the TDR would gain in convincing power by improving it on a few points. The project has several phases and the articulation between these phases needs to be summarized in this section. I can imagine that if the funding agencies will easily accept to fund the baseline solution for 2015 they are likely to request more information for supporting the different R&D lines for the MBP, the Gastof, Diamond and timing Si prototypes. The first question, which is not clearly answered in the document (or only in a scattered way, which should be summarized at the end) is the following: is each of these developments mandatory for the success of the physics program or can they be considered as useful upgrades only? I think that will make a strong difference in the overall strategy. I don't know if there is sufficient available information for that or if there is enough time to collect it but I would have liked

to see in section 7 a table summarizing the baseline and alternative options indicating (possibly in a quantitative and very synthetic way) the physics potential and limits for each of them.

- 9- On a similar track the decision mechanism and timescale for it for selecting the best options should also be summarized. One suggestion is to do it on a Gant chart with clear indication of milestones on the basis of which decisions could be made.
- 10- It would have been nice to make a judgment about the amount of money requested for each of the items shown in the financial table at the end to see if it looks realistic in the timeframe proposed. By the way this timeframe is actually very vaguely proposed. Ideally a spending profile should be shown. Another point for this table. It is mentioned in the document (section 5.2.10) that some R&D will go on on Quartic improvements. Maybe a line should be added n the table for this.

Please take all these comments as suggestions only, hoping that they can help. Once again the document in its present form is already of excellent quality.

Bet regards

Paul Lecoq