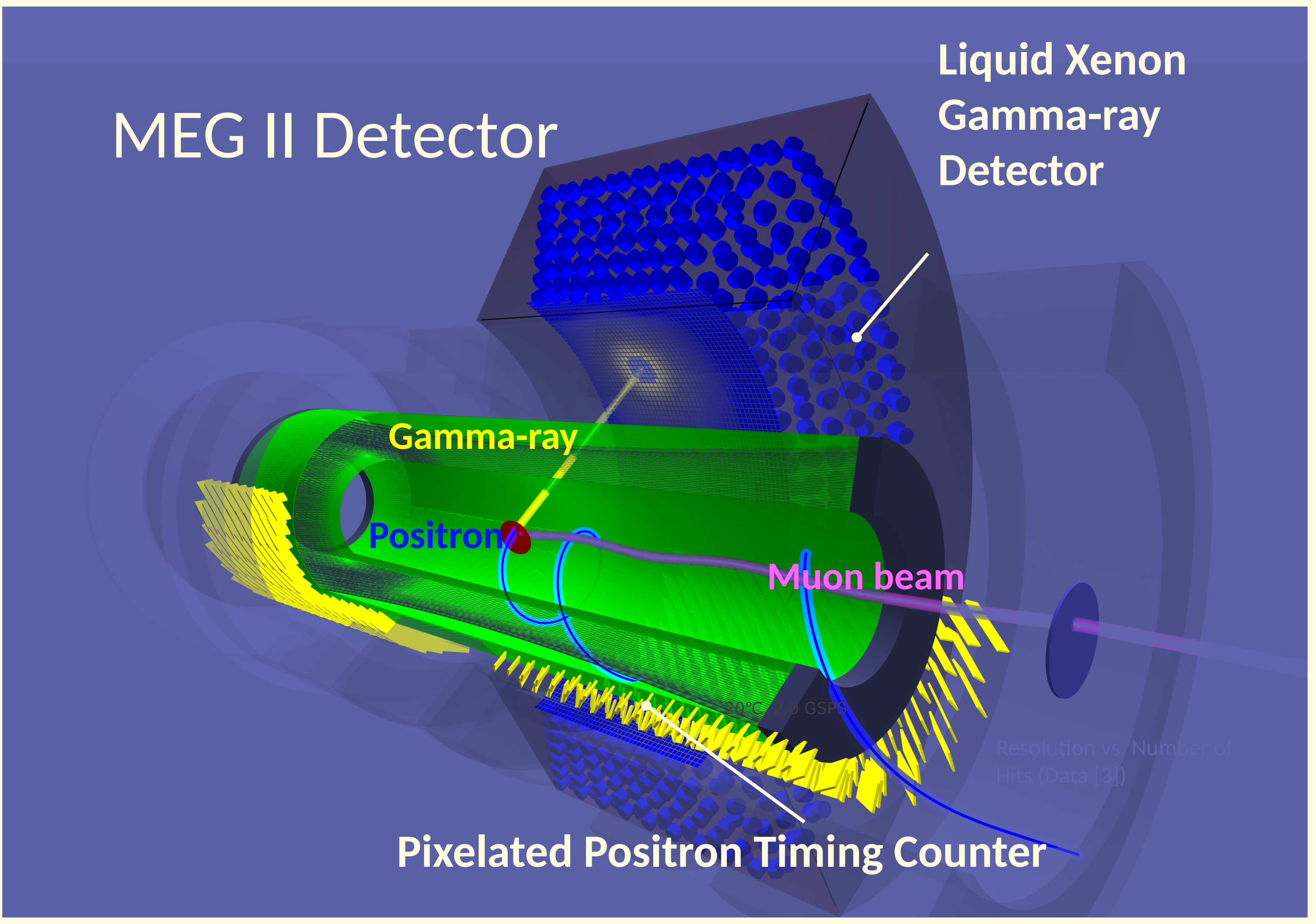


Operational results with the pixelated Time Detector (pTC) of MEGII experiment during the first year of physics data taking

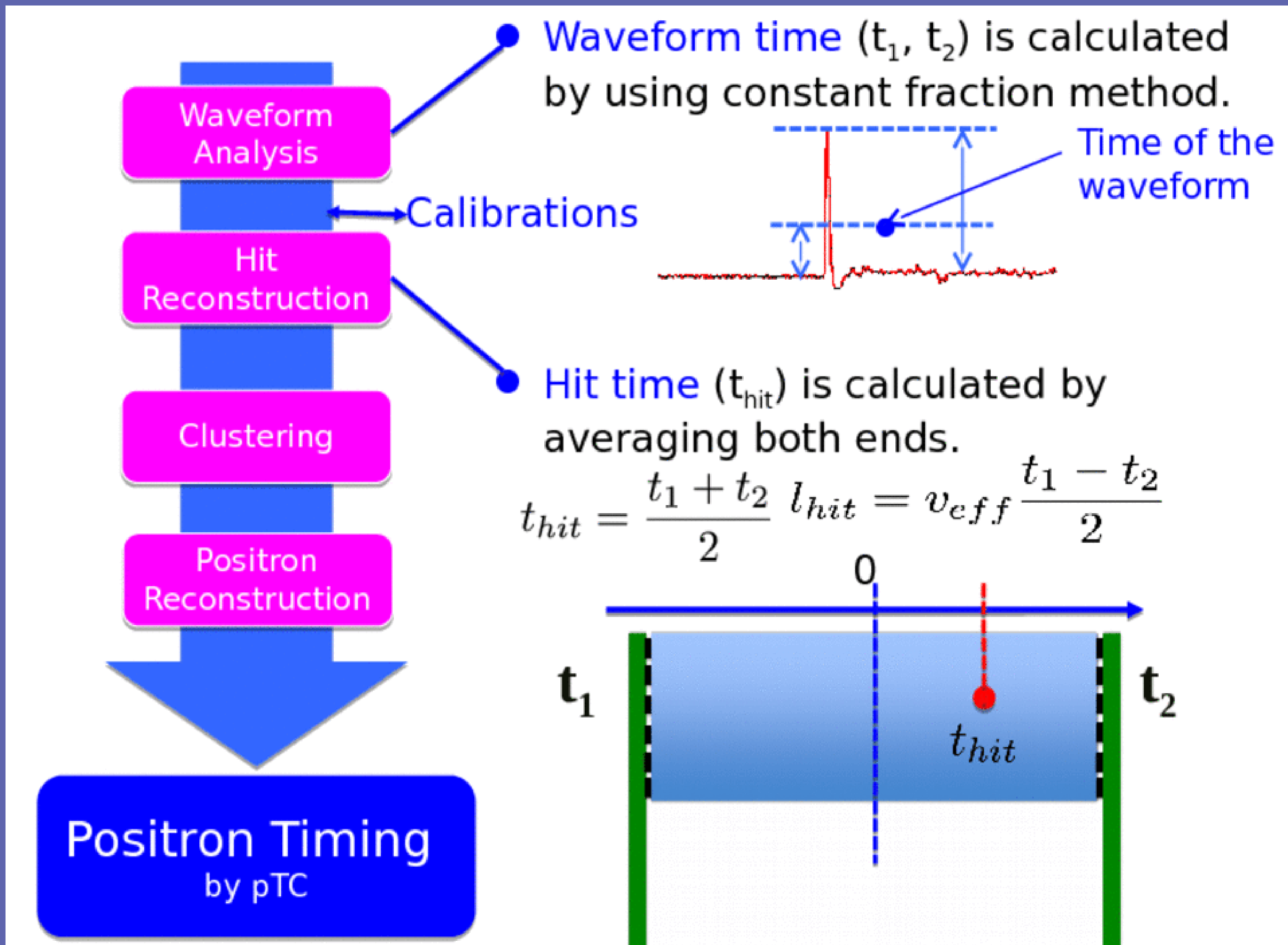
-13

Abstract: The experiment MEG II is designed to improve by an order of magnitude the current sensitivity 4.2×10^{-10} reached by MEG on the search for $\mu^+ \rightarrow e^+ \gamma$ decay. A crucial part of MEG II is a pixelated Timing Counter (pTC) developed to measure the positron timing with high accuracy. The pTC is segmented into 512 scintillation counters. Since the positron time is measured independently by several counters (~ 9 on average), the timing resolution improves significantly compared to single counter resolution. We constructed and installed the pTC and performed commissioning runs at piE5 beam line at PSI starting from 2015. 2021 was the first year of physics data taking. Timing resolution was excellent at ~ 38 ps since the start, in the following years some problems emerged: SiPM detachment, noise, radiation damage. Those issues are discussed and the steps to solve or mitigate them are detailed. The possibility of an partial upgrade is presented.

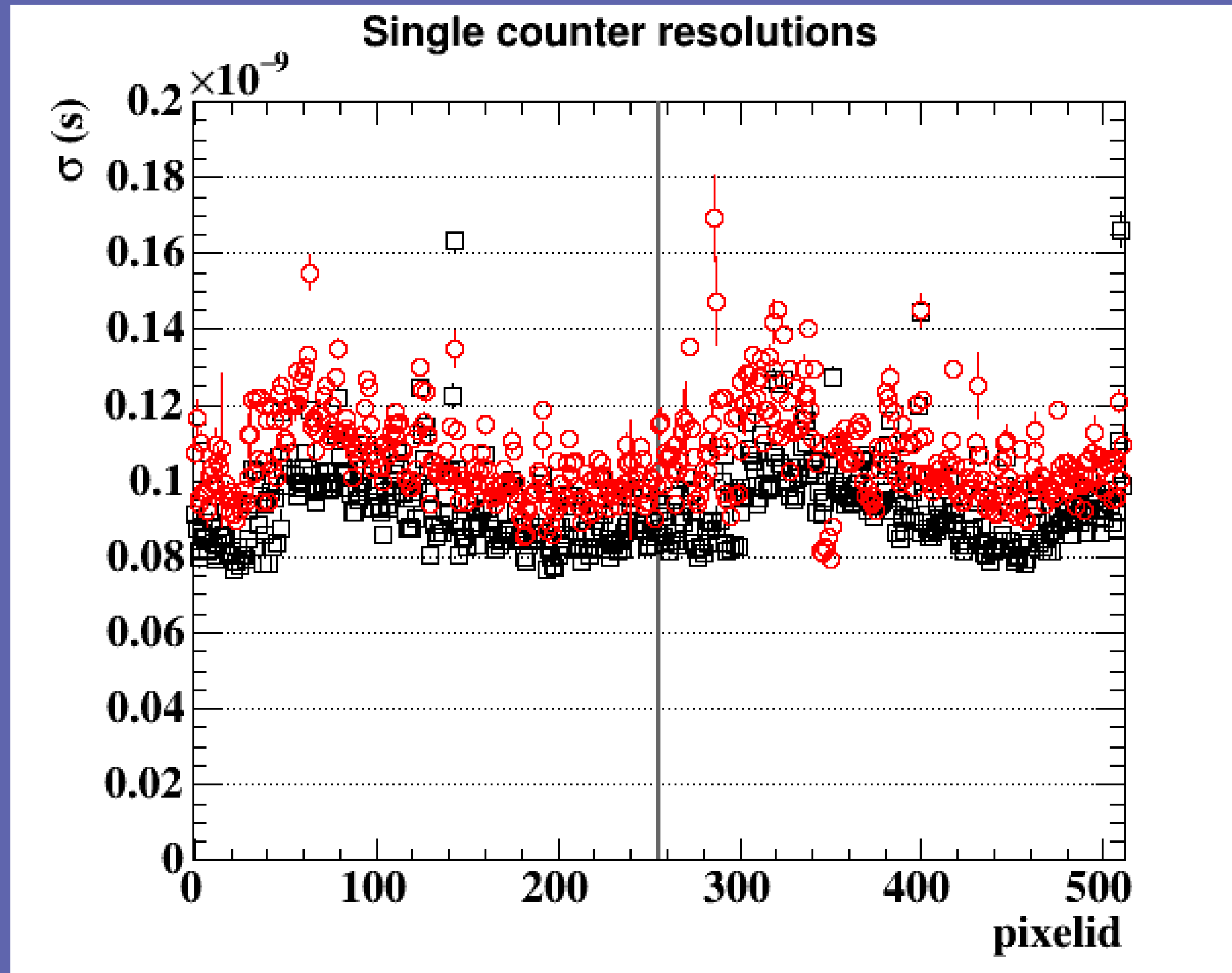


Physics Run 2021

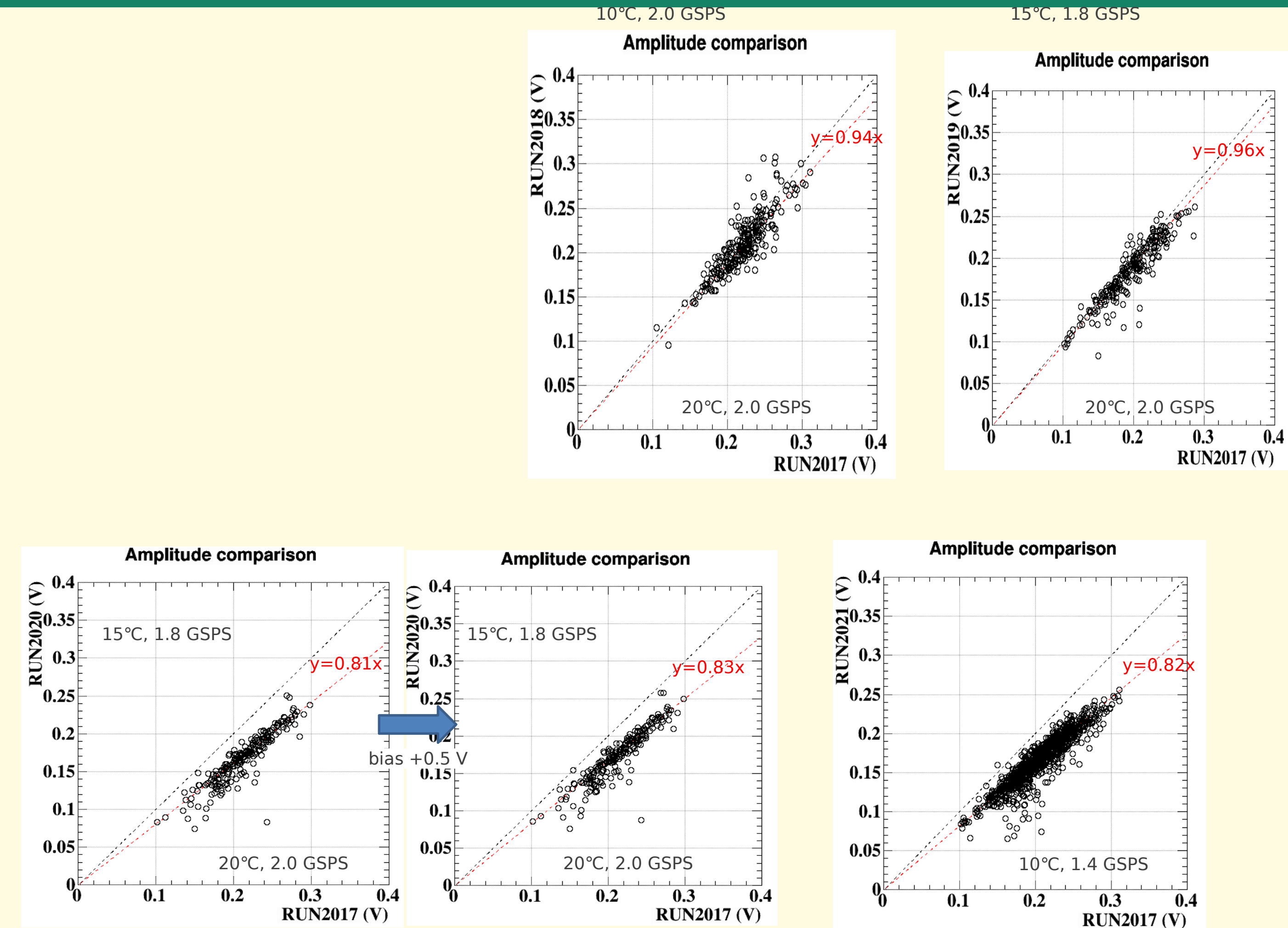
- All counters (512) installed and tested in MEG II site, $\pi E5$ beam line at PSI.
- **Beam:** DC surface muon beam stopped at target ($\sim 5 \times 10^7 \mu/s$).
 - **All Detectors installed:** magnet, target, pTC, drift chambers, Lxe detector, RDC
 - **Electronics:** Amplifier (x100), Shaper, Digitizer (WaveDAQ) at 1.4 GHz for pTC [4].
- Trigger:** $\mu^+ \rightarrow e^+ \gamma$ physics trigger, z



Comparison of pixel timing resolutions



Resolution degradation



Summary

- The full MEGII was installed and tested in PiE5 at PSI.
- MC/Data comparison hit rate for all counters.
- Optimization of CFD fraction
- Time resolution somehow degraded by noise, detachment and radiation damage
- Time resolution improved by a factor of 2 with respect to MEG.