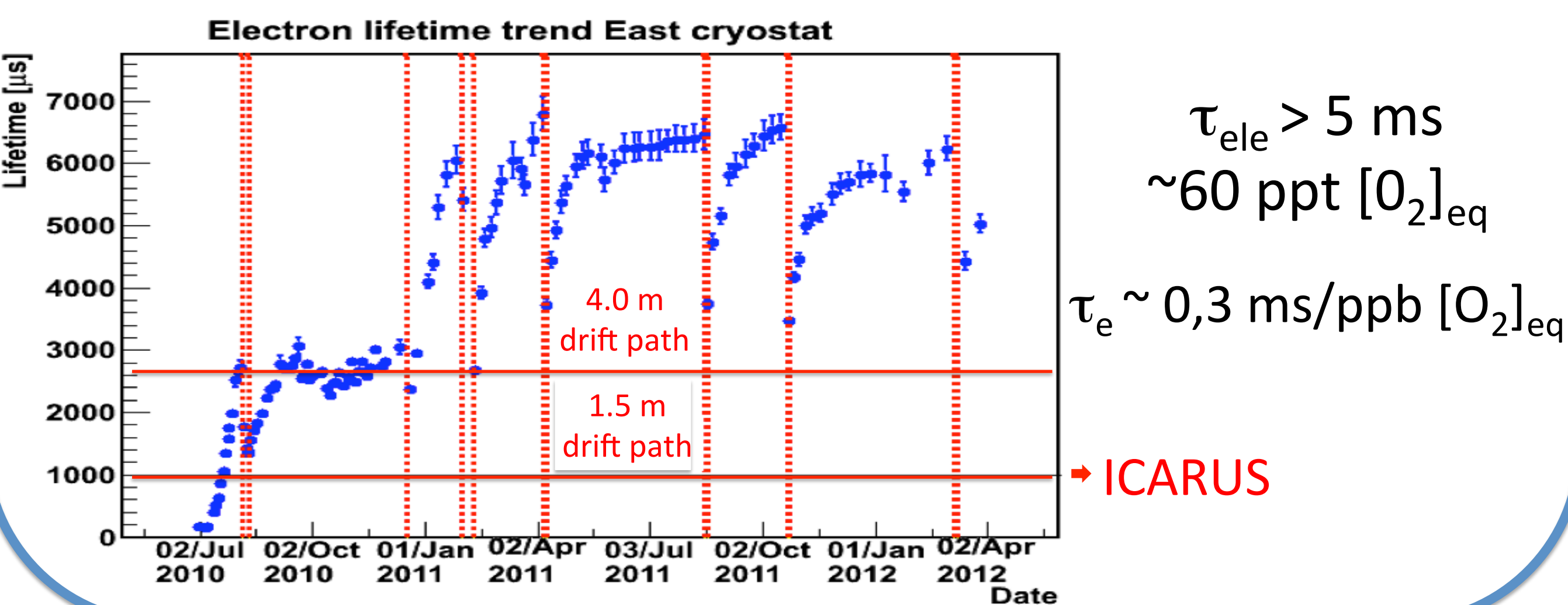


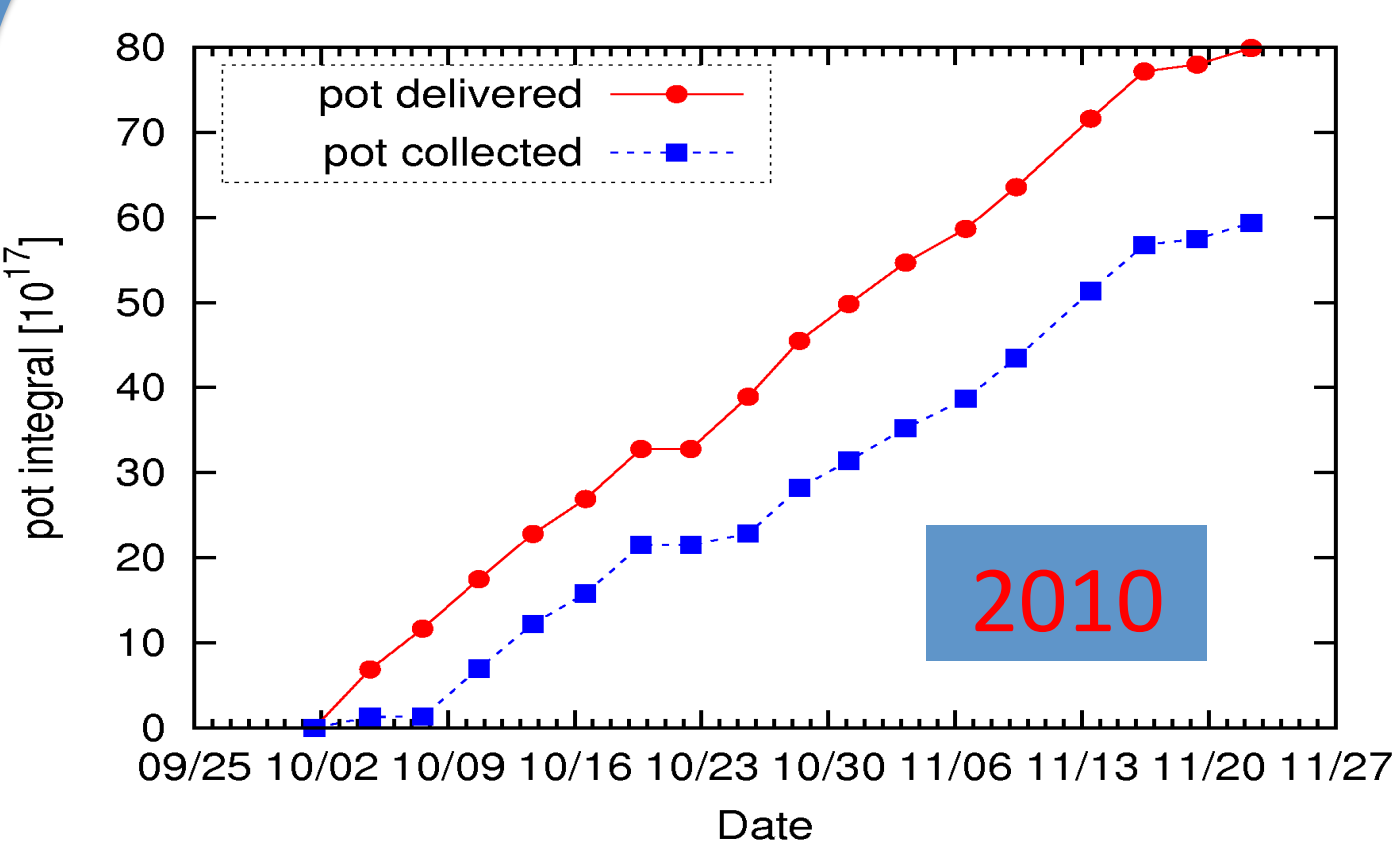
The ICARUS-T600 detector at LNGS is the largest Liquid Argon TPC (LAr-TPC) operating in an underground laboratory. Its calorimetric resolution and topology reconstruction capabilities permit a wide physics program, which goes from the study of neutrino oscillation on CNGS neutrino beam to nucleon decay searches. Atmospheric as well as solar neutrinos are also a case of study.

LAr Purity

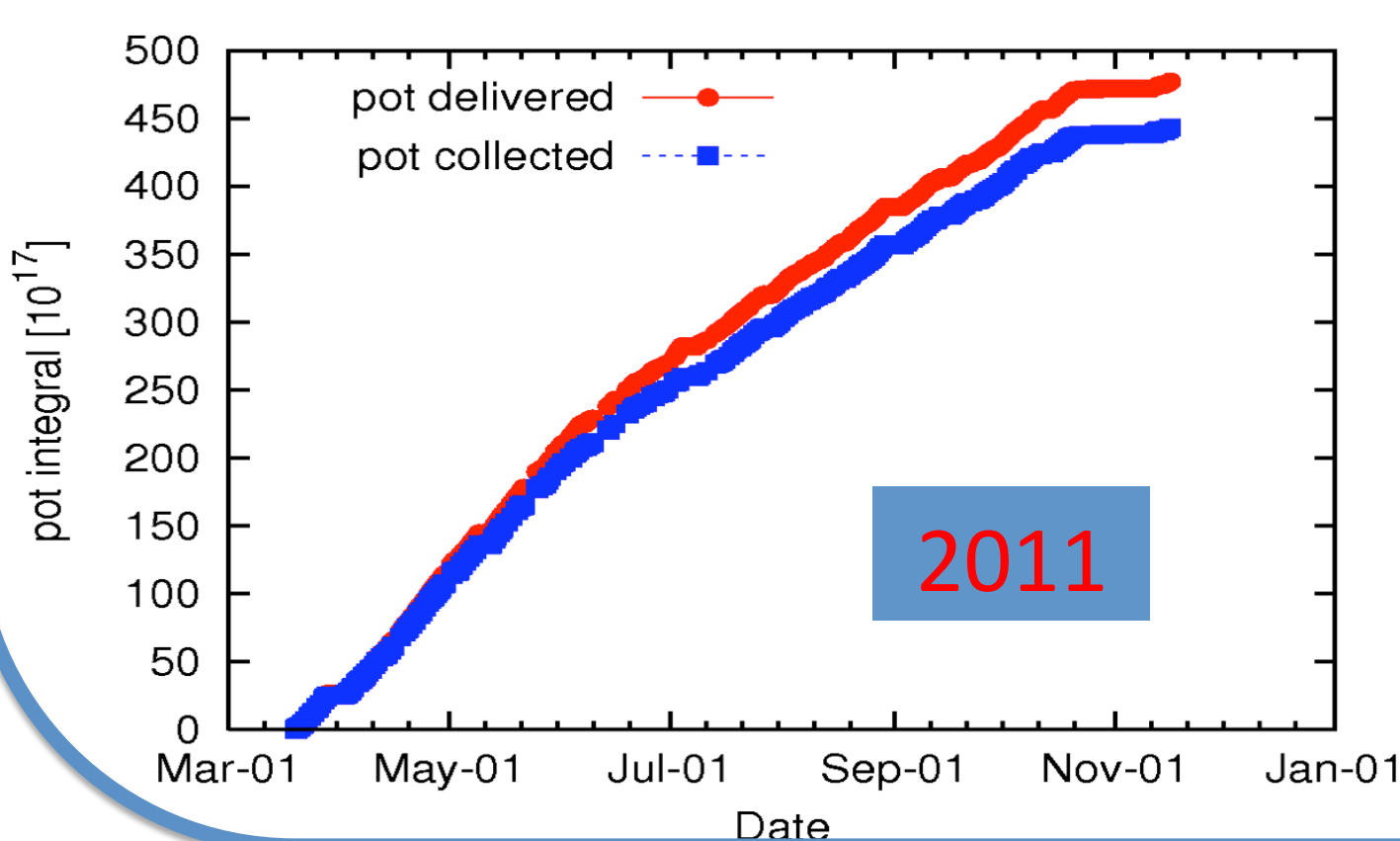
Key feature for ICARUS, and for any larger LAr TPC, is the Ar purity: electronegative molecules (O_2 , H_2O , CO_2) trap the electrons, thus reducing the collected signal. The level of purity reached is well above the limit required for a 1,5 m of drift (ICARUS) and could be suited for longer drift path (e.g. Modular arXiv:0704.1422).



Data taking



The detector has been running since May 28th 2010; after few months of commissioning it started taking data in steady condition on the CNGS neutrino beam. In 2011 the detector up-time was $> 90\%$, with dead time on CNGS $< 1\%$.

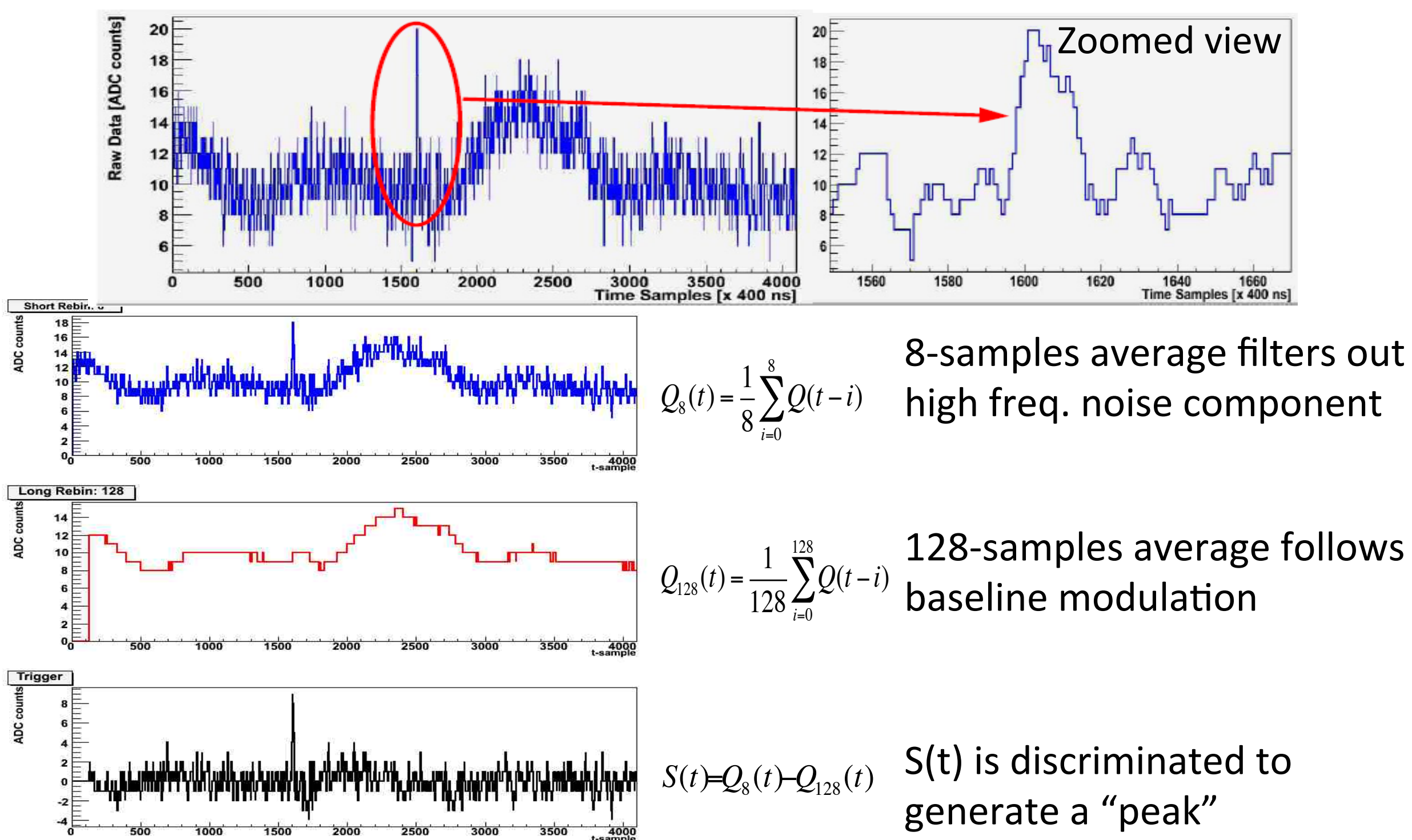


The trigger system relies on scintillation light detection by means of 72 PMTs inserted into LAr, on charge deposition via DR-slw algorithm, and, for CNGS events, on timing synchronization with the neutrino beam.

	PID	E_{dep} [MeV]	Range [cm]	Momentum [MeV/c]
1	π	113 ± 10	39.3	304 ± 18
2	p	81 ± 7	4.1	399 ± 18
3	(π)	22 ± 2	15.0	599 ± 41
4	p	61 ± 5	3.5	343 ± 15
5	π	358 ± 30	112.8	477 ± 32
6	(π)	-	8.6	180 ± 9

“DR-slw” filtering algorithm

To extract a trigger from the charge signal a new algorithm has been developed and tested; the double average filters out low and high frequency noise components.



A GTO trigger signal fires when a predefined peak's majority is satisfied.

SW-implementation

The DR-slw algorithm has been implemented as a second level software trigger for CNGS events triggered with timing synchronization. 100% efficiency on the 2010 data sample, fake rejection better than 10^{-3} .

HW-implementation

To improve the trigger efficiency at low energies, the algorithm has been implemented in FPGAs (SuperDaedalus) continuously monitoring data. As a charge deposition is detected, a trigger is fired to the whole detector. This signal will also be used for a segmentation of the DAQ. This additional trigger aims to recover PMT trigger inefficiency at energies below 500 MeV, for proton decay and atmospheric ν studies.

