

Updates on the performance of the UUBs v2

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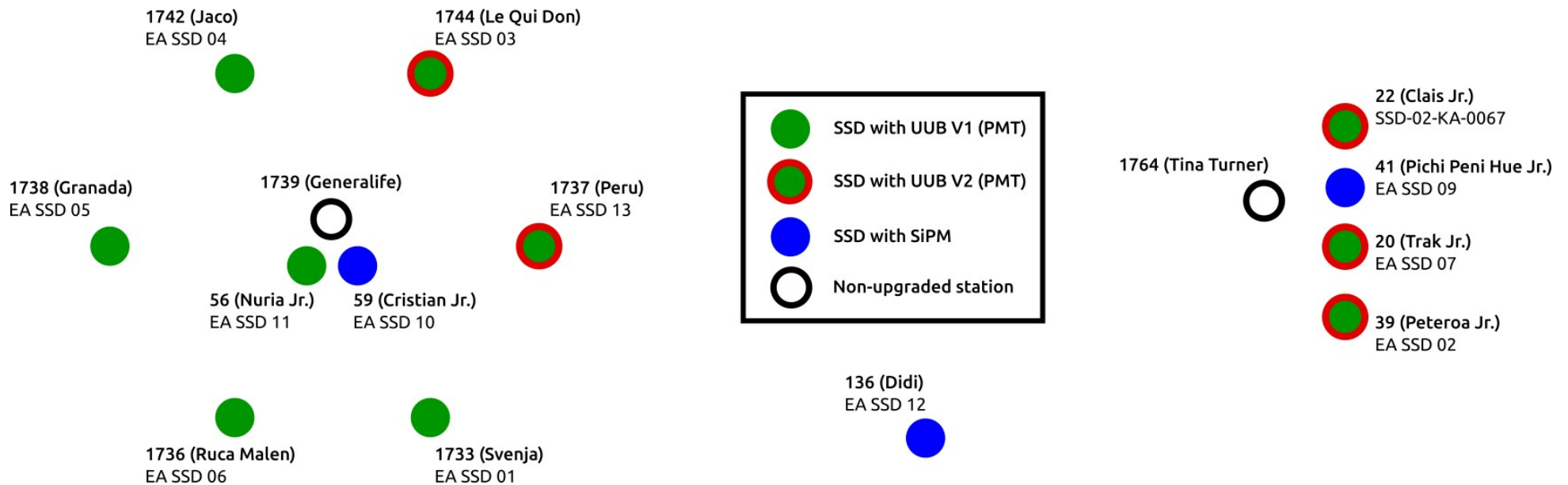
SDEU Meeting, Orsay, 13 December 2018

Outline

- Focus of this presentation
Updates on the status of the new UUBs (V2) installed in the field at Stations 20, 22, 39, 1737 & 1744

1. Calibration
2. HG/LG ratio
3. Baselines RMS
4. Spikes

- Dataset
Data from EA Stations up to 6th December 2018



Status of EA detectors

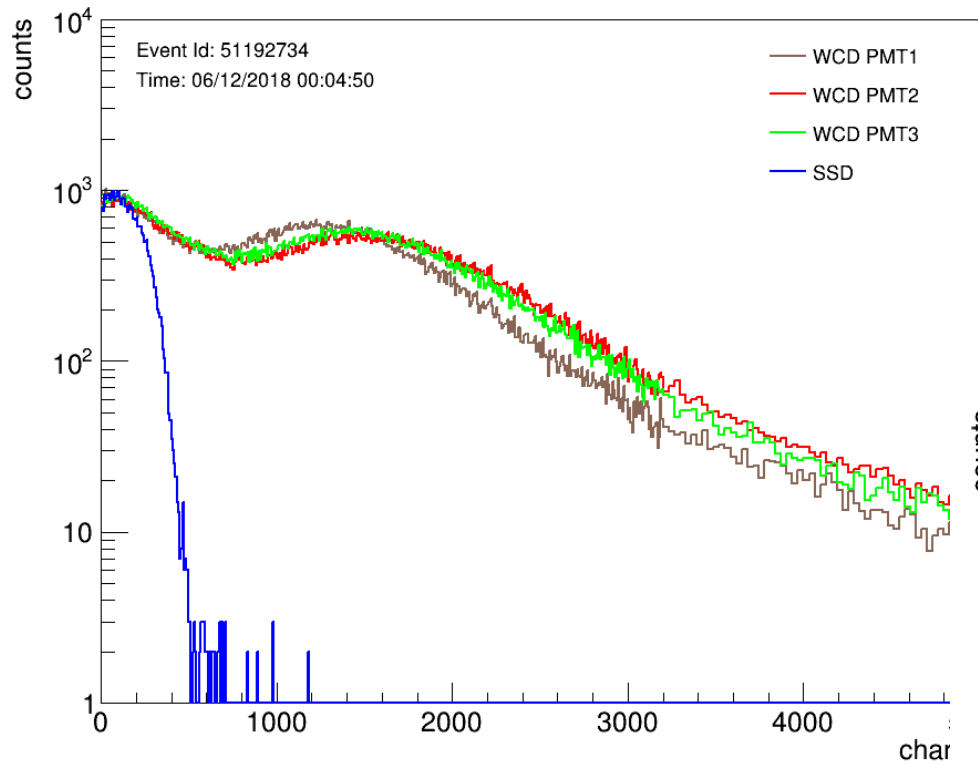
Data Analysis up to 6th December 2018

In Blue → Stations with new UUB (V2)

Station (Id)	SSD info	PMT1	PMT2	PMT3	SSD	issues
Trak Jr (20)	PMT & CAEN	✓	✓	✓	✓	-
Clais Jr (22)	PMT & ISEG	✓	✓	✓	✓	-
Peteroa Jr (39)	PMT & CAEN	✓	✓	✓	✓	-
Pichi Peni Hue (41)	SiPM	✓	✓	✓	✓	few events w/ fitted histogram
Nuria (56)	PMT & CAEN	✓	✓	✓	✓	-
Cristian (59)	SiPM	✓	✓	✗	✓	few events w/ fitted histogram
Svenja (1733)	PMT	✓	✓	✓	✓	-
Ruca Malen (1736)	PMT & CAEN	✓	✓	✓	✗	no ssd calibration
Peru (1737)	PMT & ISEG	✓	✓	✓	✗	no ssd calibration
Granada (1738)	PMT & CAEN	✓	✓	✓	✓	-
Jaco (1742)	PMT & ISEG	✓	✓	✓	✓	-
Le Qui Don (1744)	PMT & ISEG	✗	✗	✗	✗	not working (?) last event on 15.11.2018

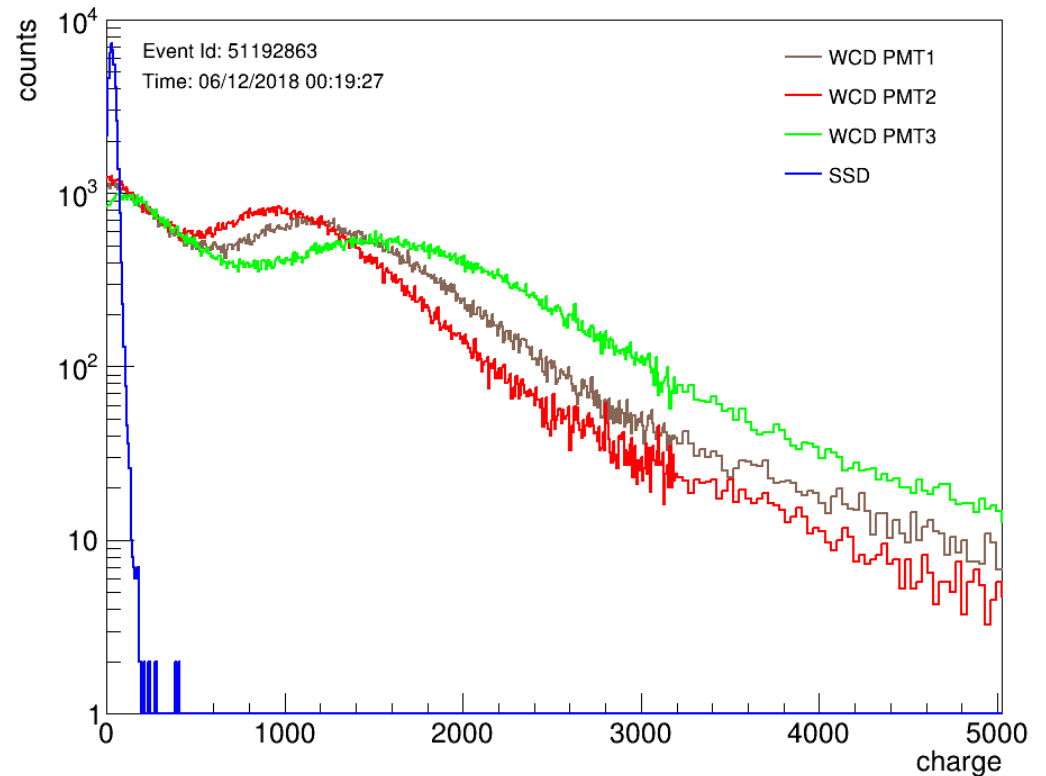
Charge histograms

Station: 1736 (Ruca Malen)



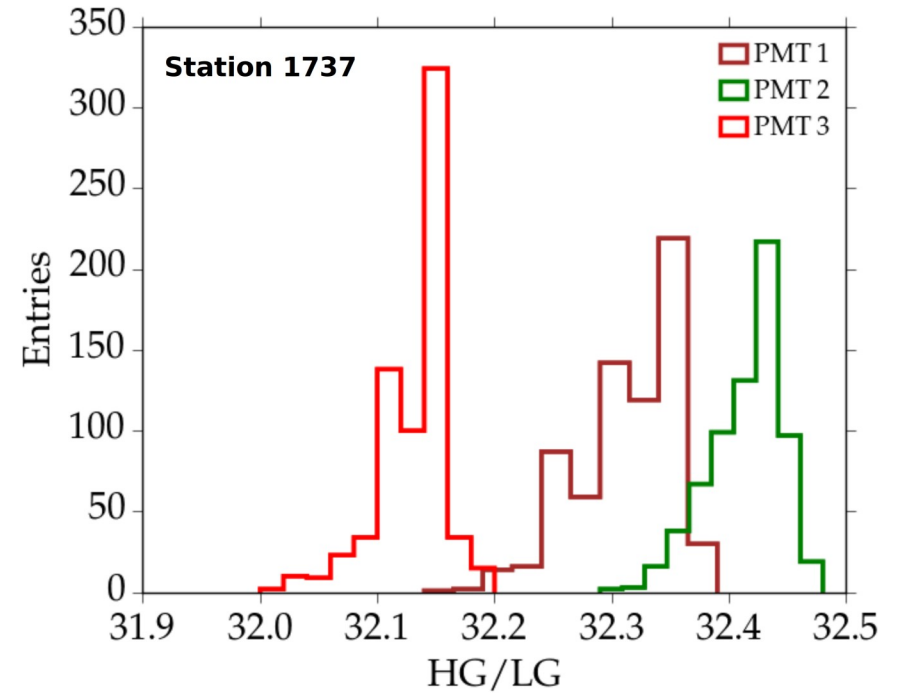
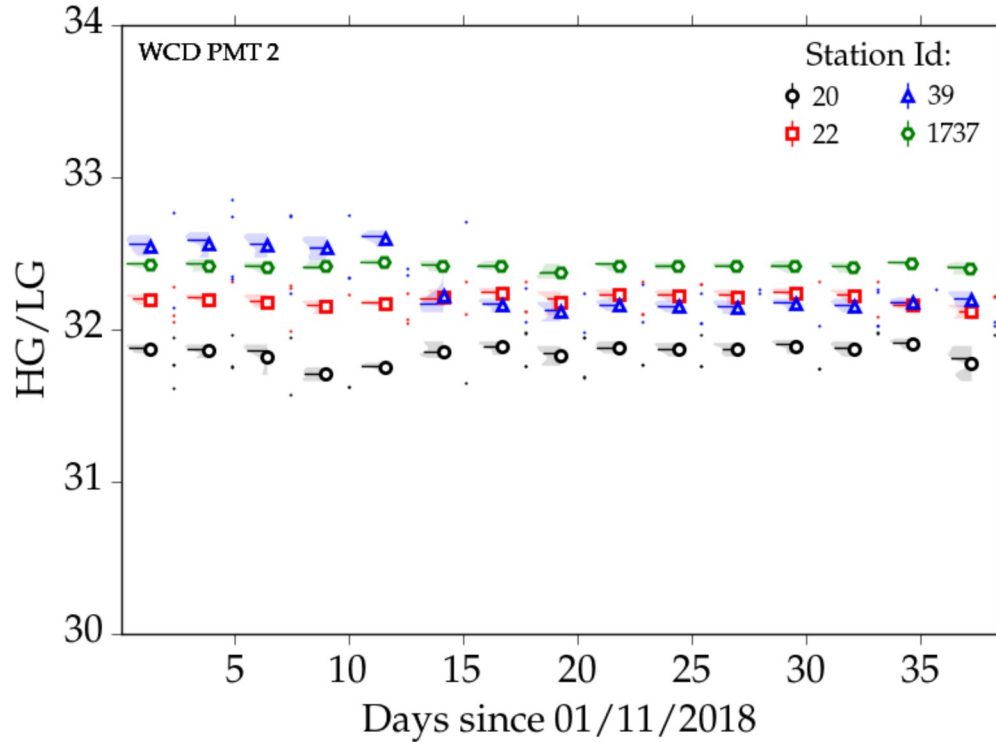
Bad calibration histograms of SSD at stations Ruca Malen (1736) and Peru (1737)

Station: 1737 (Peru)



HG/LG Ratio

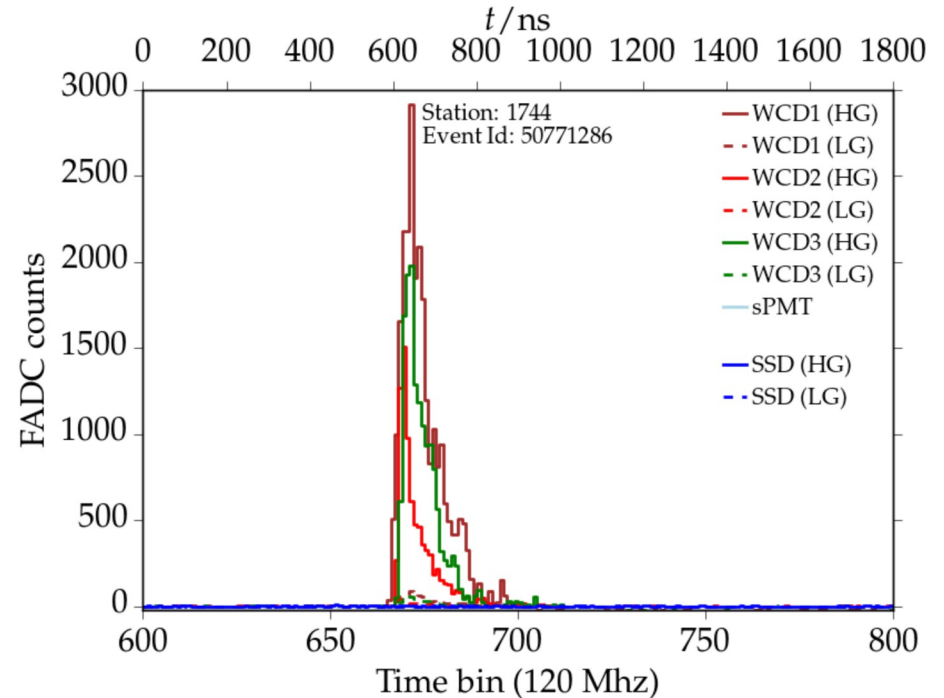
HG/LG ratio for WCD taken from Extra[] fields in CDAS IoSdData



Station (Id)	WCD - PMT1	WCD - PMT2	WCD - PMT3
Trak Jr (20)	31.96	31.86	32.07
Clais Jr (22)	32.14	32.20	32.36
Peteroa Jr (39)	32.56	32.19	31.95
Peru (1737)	32.32	32.42	32.14
Le Qui Don (1744)	32.07	32.25	31.76

Baseline and “lateline” RMS | HG

- **baseline RMS calculated** on **individual traces** before signal start (first 500 bins)
- **RMS also calculated** in the **late part** of the trace (last 500 bins)
- Increase of RMS at late part of the trace

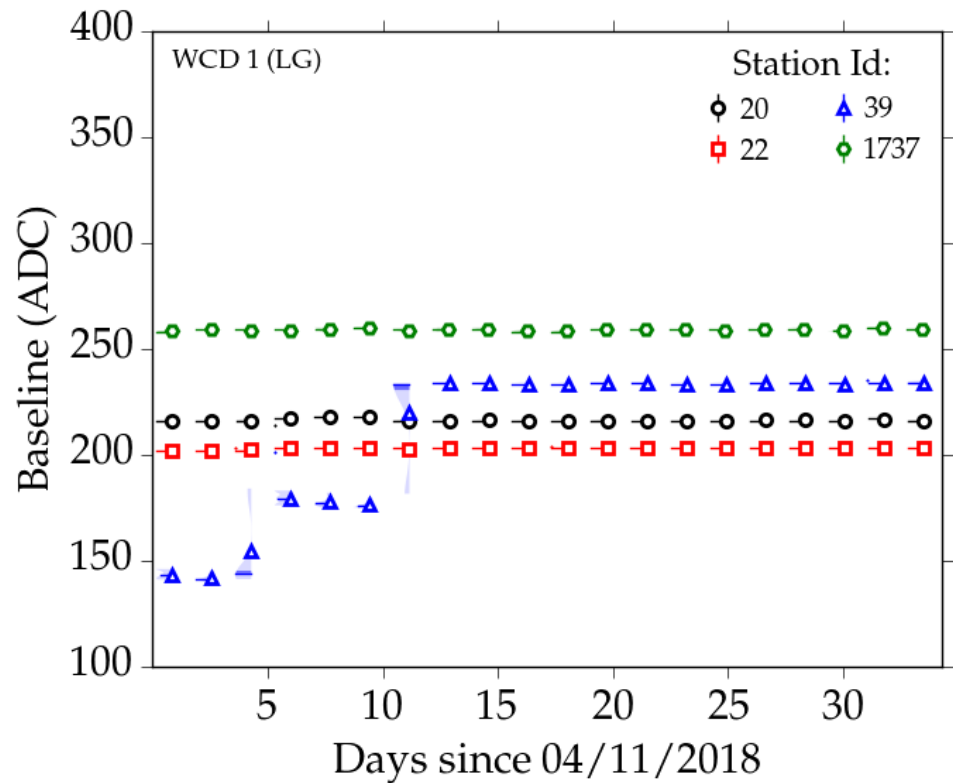
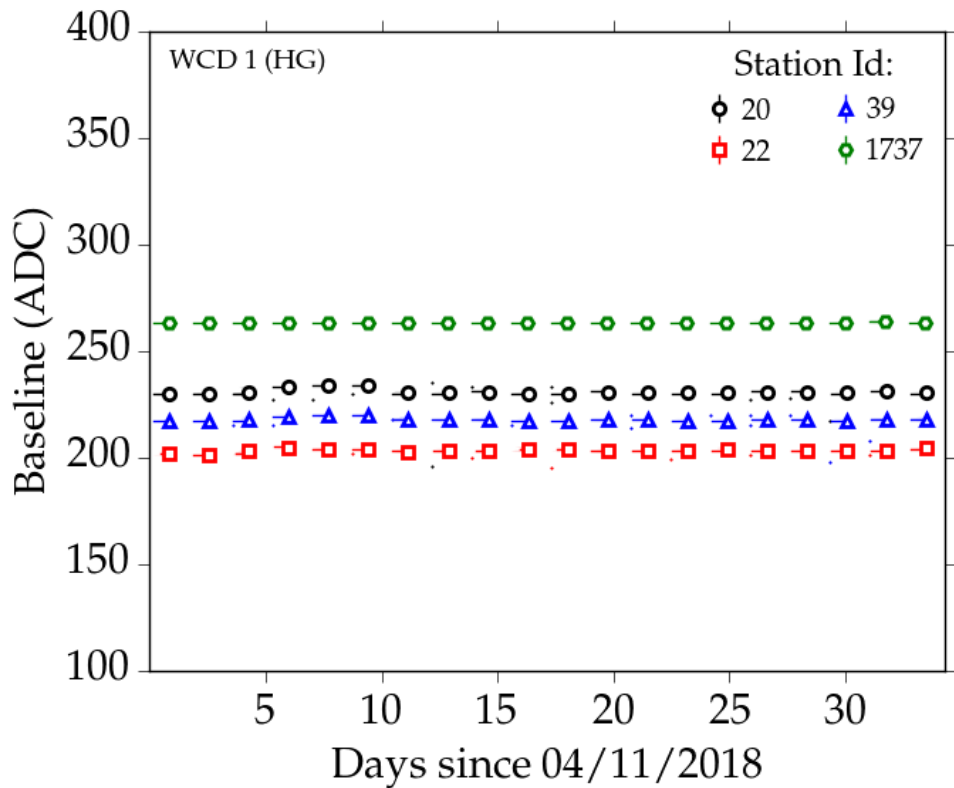


Station (Id)	BASELINE RMS (HG)			
	PMT1	PMT2	PMT3	SSD
Trak Jr (20)	1.902	1.936	1.917	2.025
Clais Jr (22)	1.948	2.008	1.962	2.115
Peteroa Jr (39)	1.986	1.913	1.539	2.858
Peru (1737)	1.933	1.879	1.954	1.821
Le Qui Don (1744)	1.876	1.909	1.840	2.135

LATELINE RMS (HG)			
PMT1	PMT2	PMT3	SSD
1.927	1.933	1.940	2.045
1.989	2.005	2.009	2.120
2.005	1.926	1.566	2.859
1.953	1.888	1.975	1.822
1.910	1.911	1.886	2.137

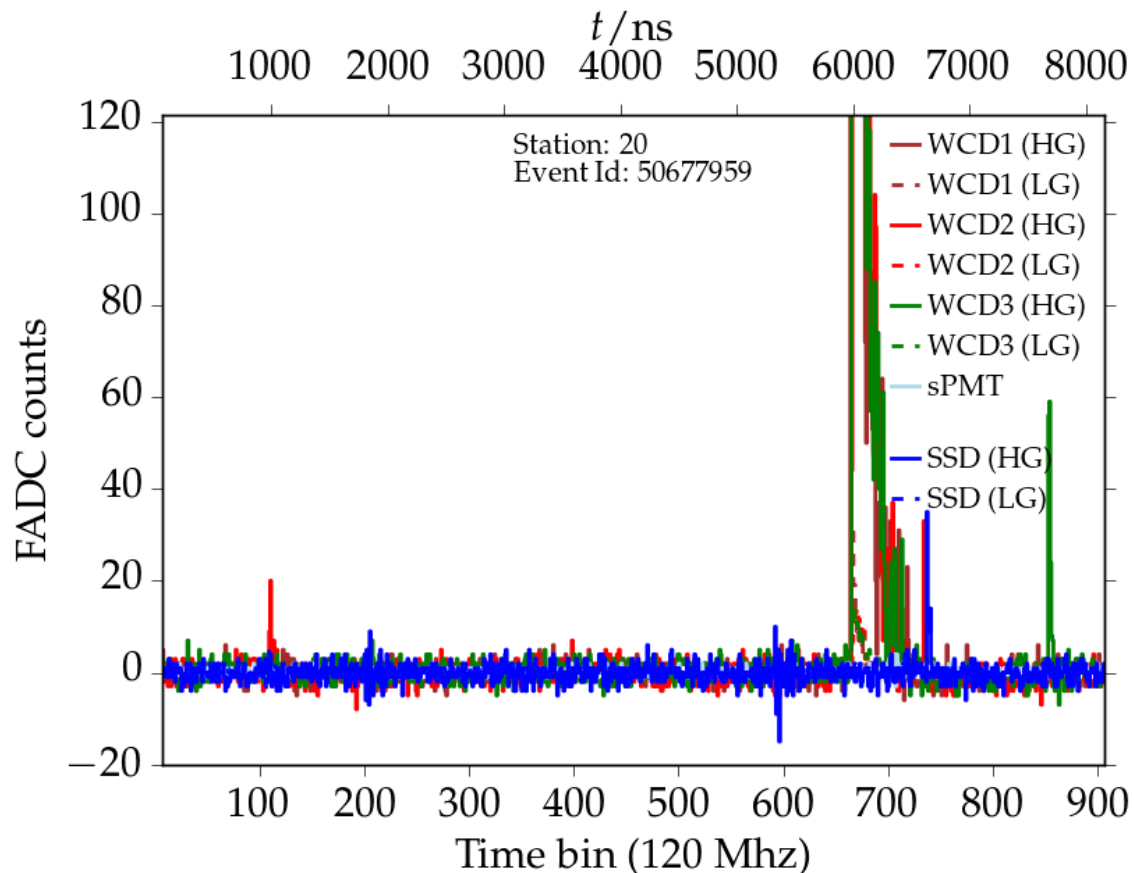
Baseline evolution with time

Profiles of baseline over time - **WCD PMT 1**

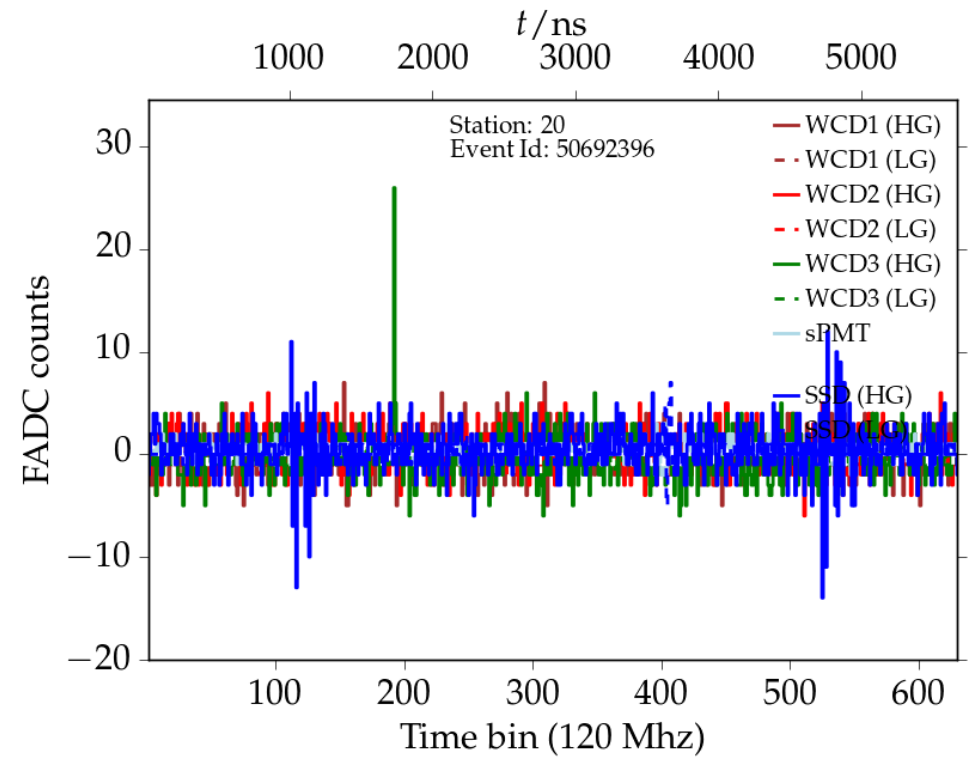
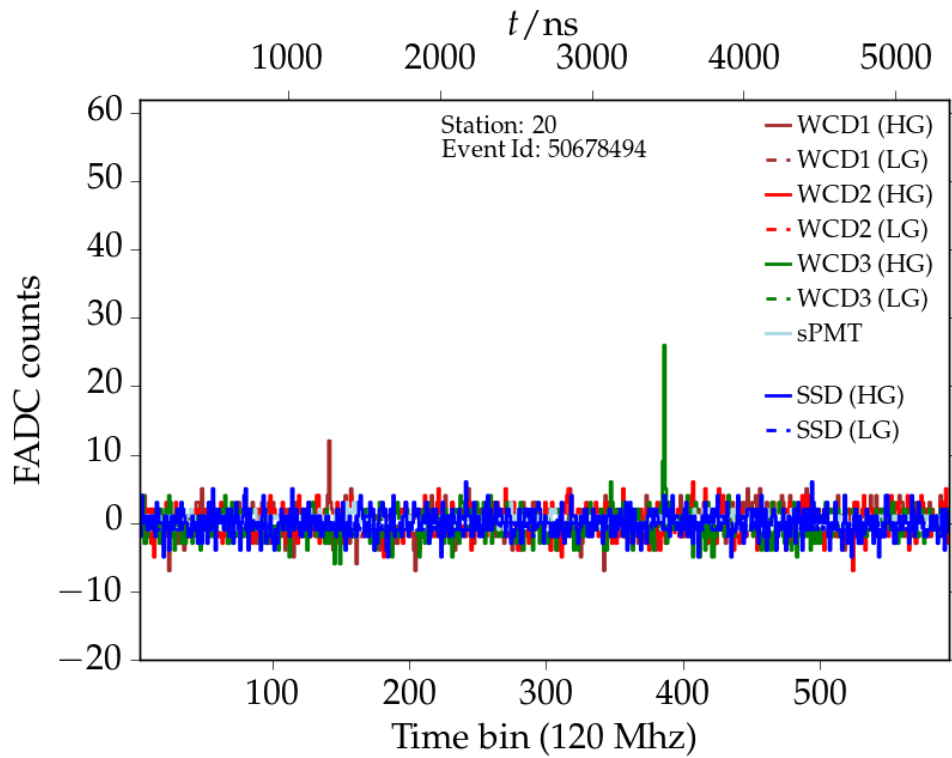


Spikes in time traces

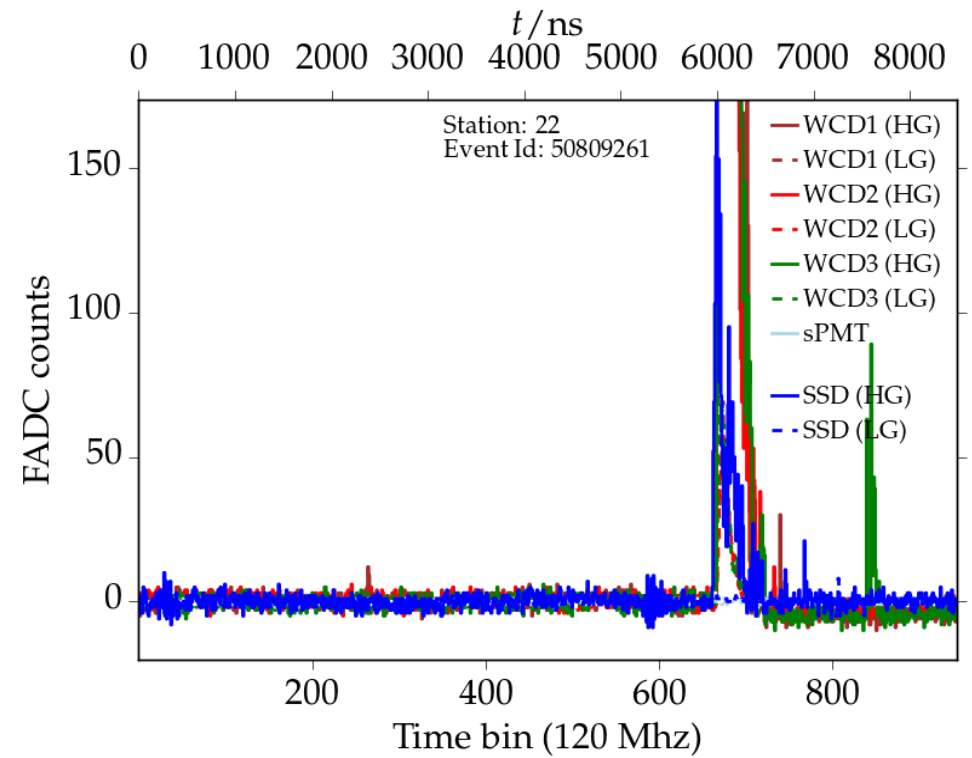
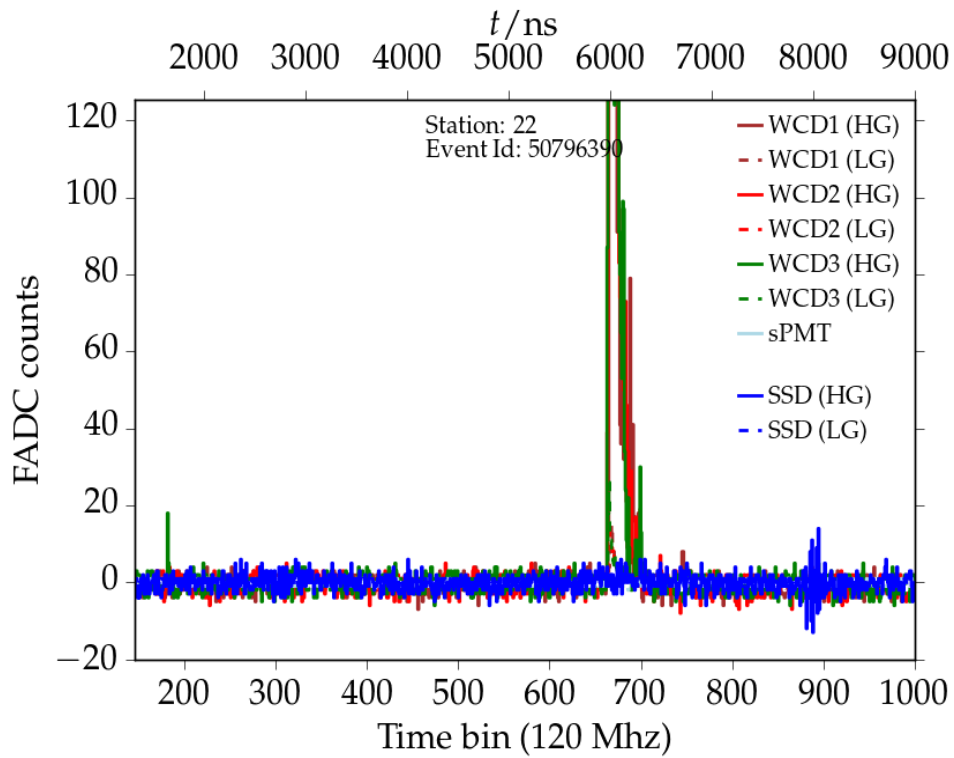
- Algorithm to find spikes in part of the trace used to estimate baseline signal - base > 5*RMS before signal start
- Spikes found in **SSD** traces
- **WCD**: spikes or background muons?



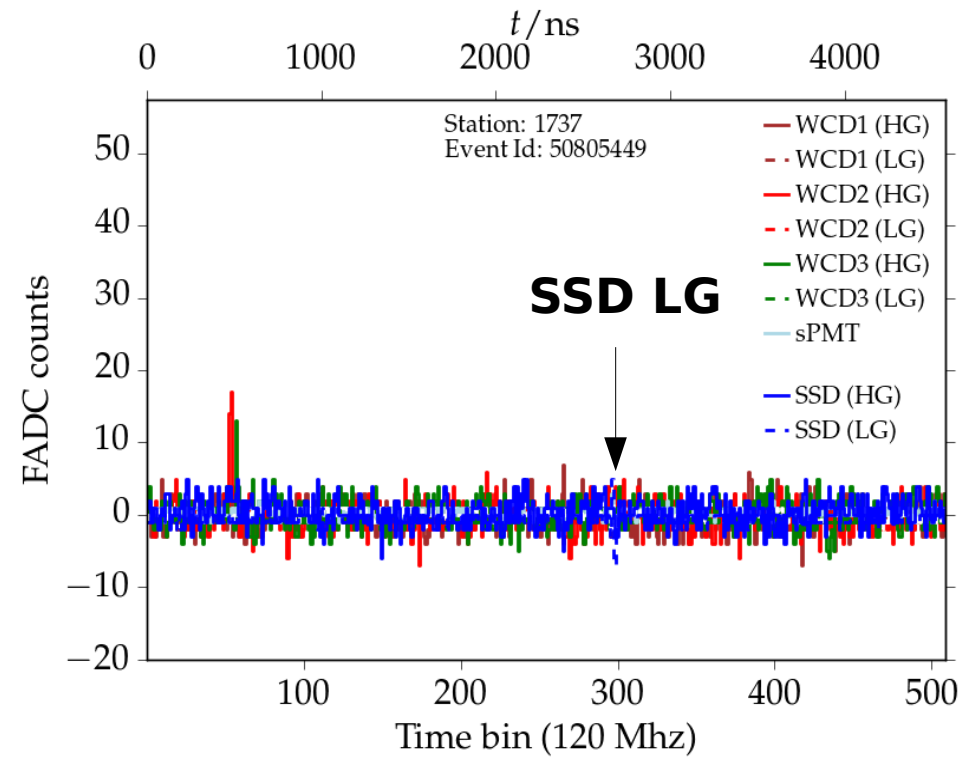
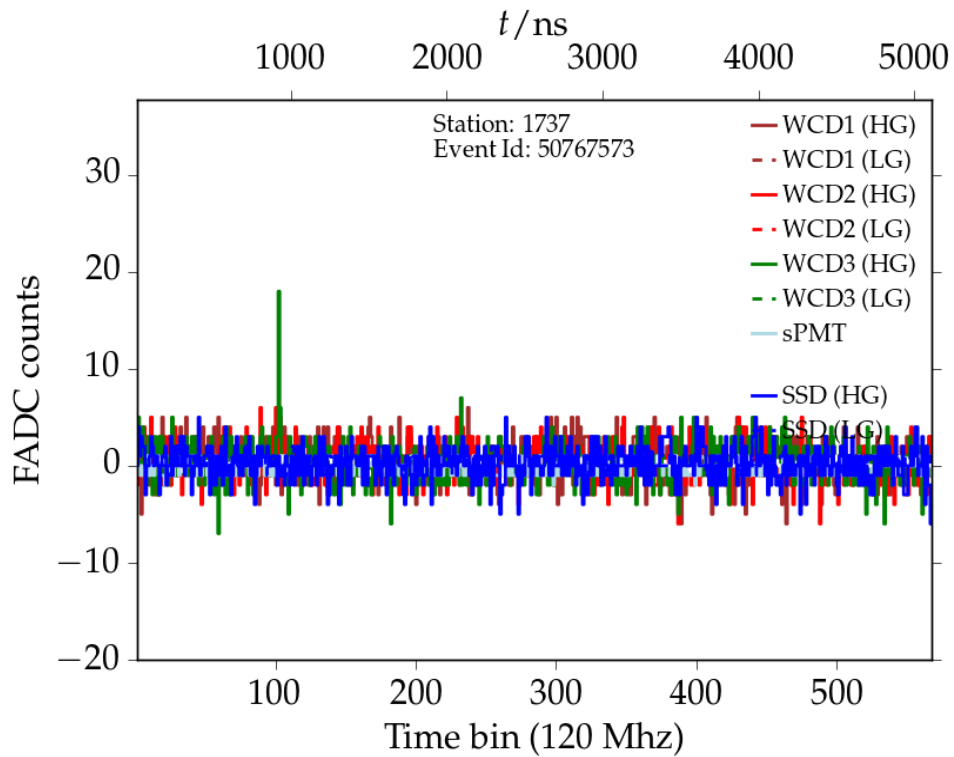
Spikes in time traces | Station 20



Spikes in time traces | Station 22



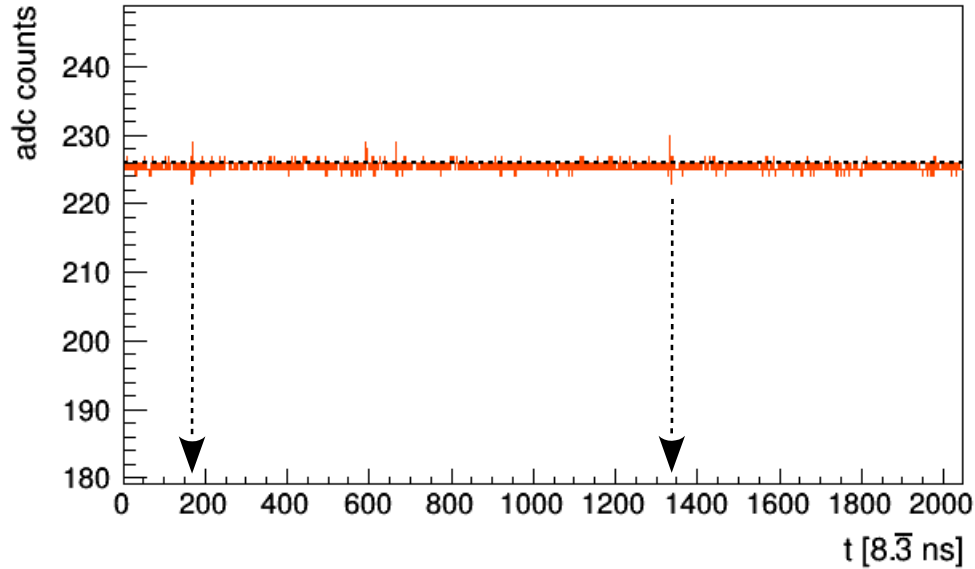
Spikes in time traces | Station 1737



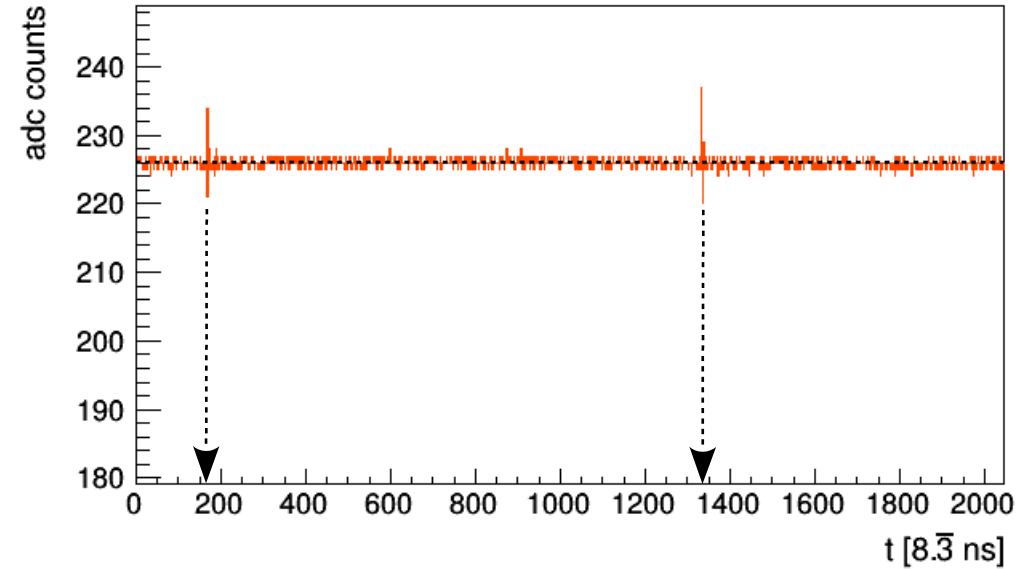
Spikes in FADC Traces | sPMT & SSD (LG)

Spikes in SSD LG channel and sPMT at same position?

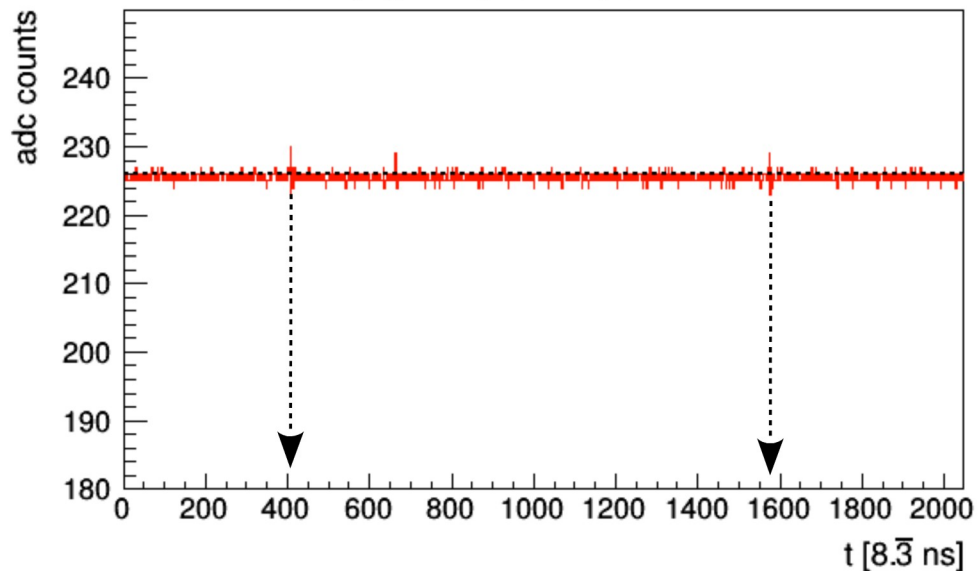
Trak Jr. (20), PMT 4(smallPMT) at 570m



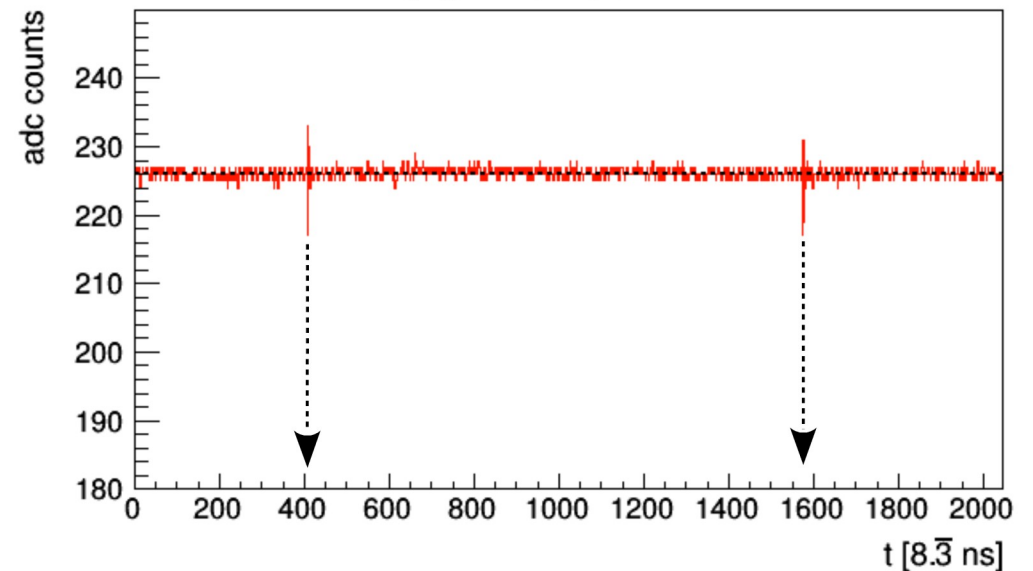
Trak Jr. (20), PMT 5(SSD) at 570m



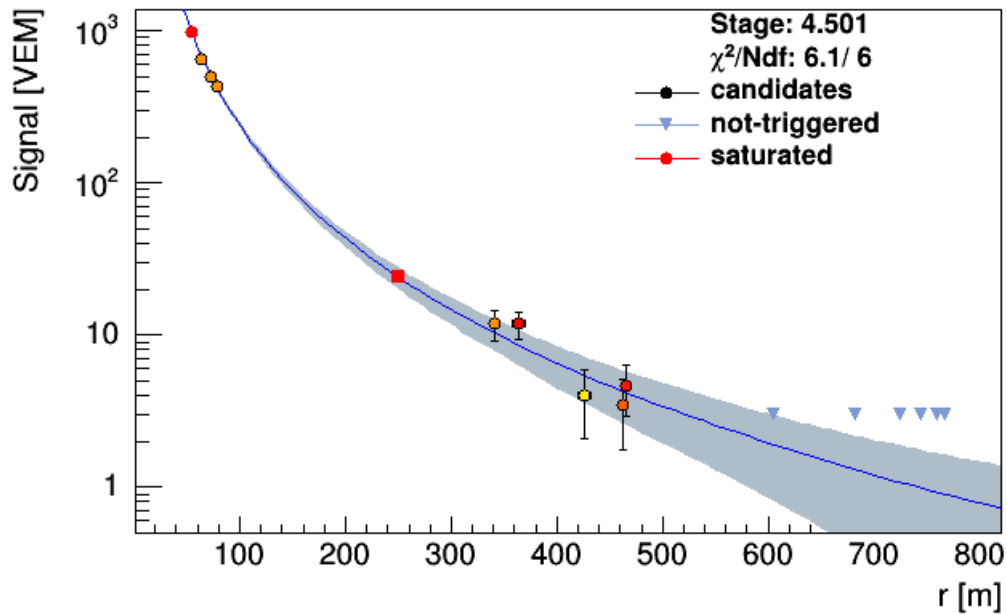
Trak Jr. (20), PMT 4(smallPMT) at 335m



Trak Jr. (20), PMT 5(SSD) at 335m

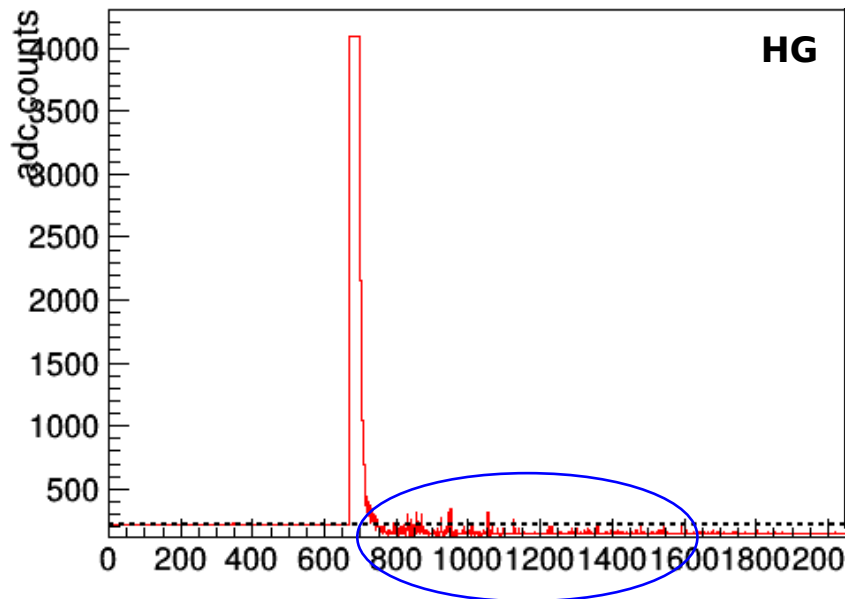


Event Reconstruction with saturated stations

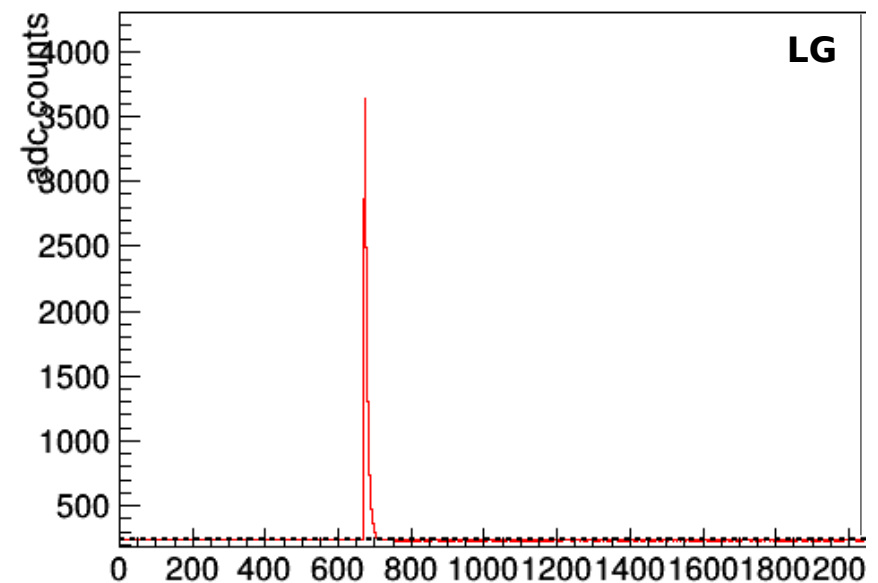


- Event 51117968, 2018/12/01 00:22:43 UTC
- **3** upgraded stations **HG saturated** (1 LG saturated)
- **Good fit** of the **LDF** using upgraded stations
- **Undershoot** visible for the **HG channel** (no recovery)
- **Undershoot not seen in LG channel** (used for signal calculation)

Peteroa Jr. (39), PMT 1 at 54m



Peteroa Jr. (39), PMT 1 at 54m



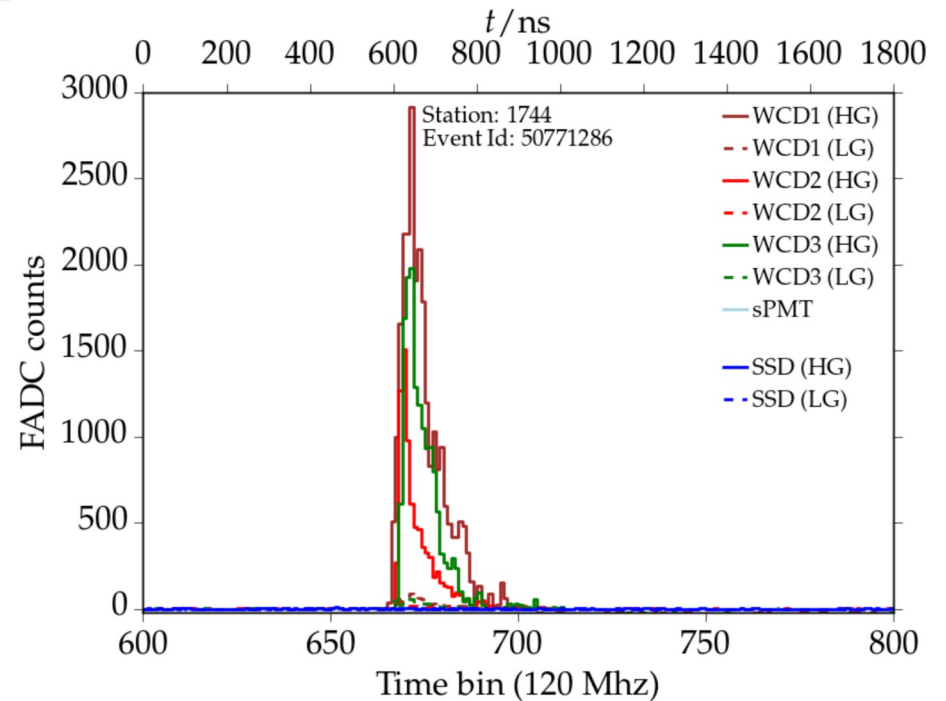
Summary

- **Station Le Qui Don (1744) is down since 15/11/2018**
- **HG/LG ratios** obtained from Extra fields in CDAS IoSdData show reasonable behavior over time
- **Baseline RMS** computed using **first** and **late part** of the **traces**: similar values but increasing after signal. Values of **~1.9 ADC** for **HG** and **~0.5 ADC** for **LG** (see backup)
- Look for **spikes** in **traces** counting **bins above threshold** signal $> 5 \cdot \text{RMS}$
 - **spikes** found in **SSD**
 - **spikes** in **WCD** too? (less frequent) or **background particles?**

backup

Baseline and “lateline” RMS | LG

- **baseline RMS calculated** on **individual traces** before signal start (first 500 bins)
- **RMS also calculated** in the **late part** of the trace (last 500 bins)

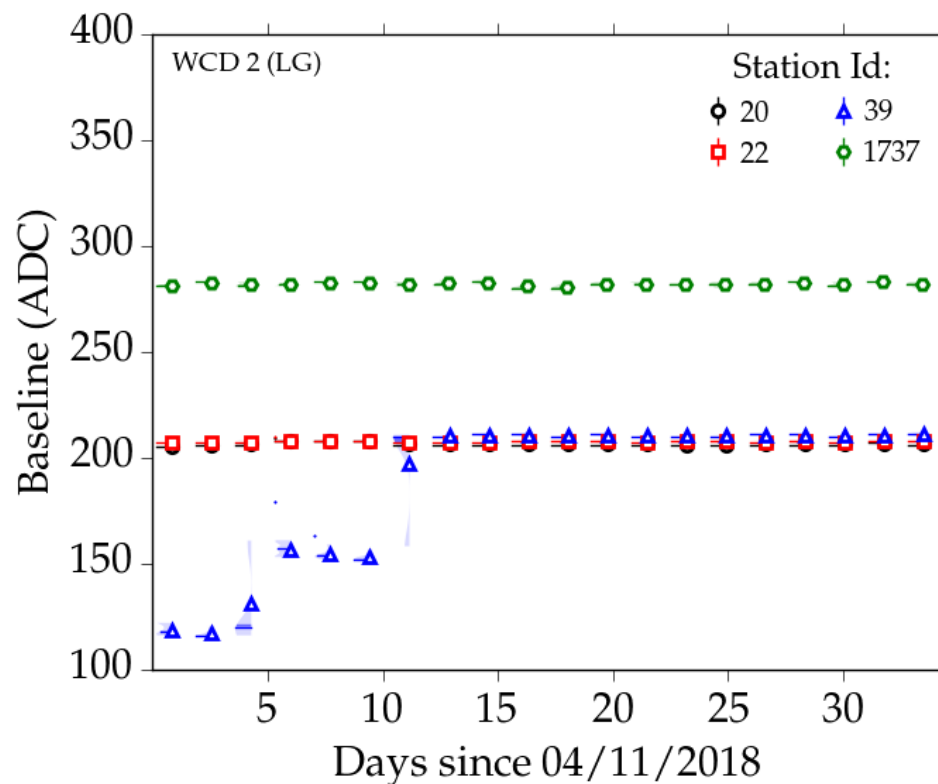
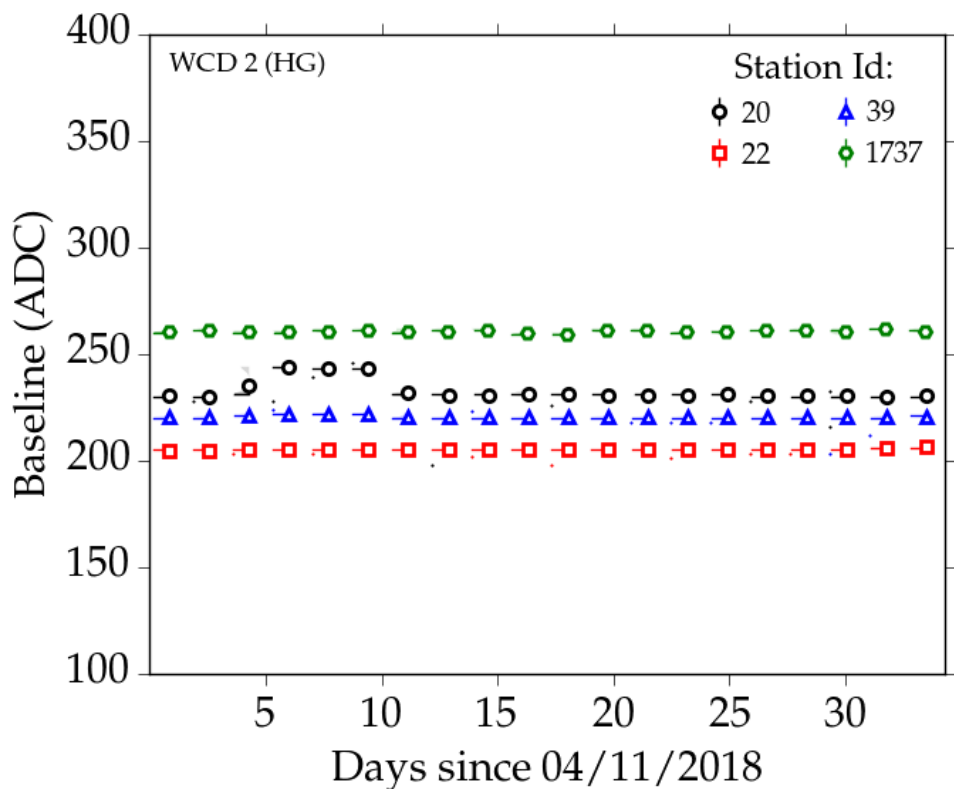


Station (Id)	BASELINE RMS (LG)			
	PMT1	PMT2	PMT3	SSD
Trak Jr (20)	0.559	0.573	0.571	0.634
Clais Jr (22)	0.574	0.569	0.566	0.604
Peteroa Jr (39)	0.558	0.570	0.576	0.624
Peru (1737)	0.546	0.546	0.546	0.597
Le Qui Don (1744)	0.551	0.556	0.563	0.613

LATELINE RMS (LG)			
PMT1	PMT2	PMT3	SSD
0.559	0.576	0.571	0.628
0.573	0.570	0.569	0.602
0.561	0.572	0.580	0.628
0.548	0.545	0.543	0.596
0.550	0.552	0.568	0.605

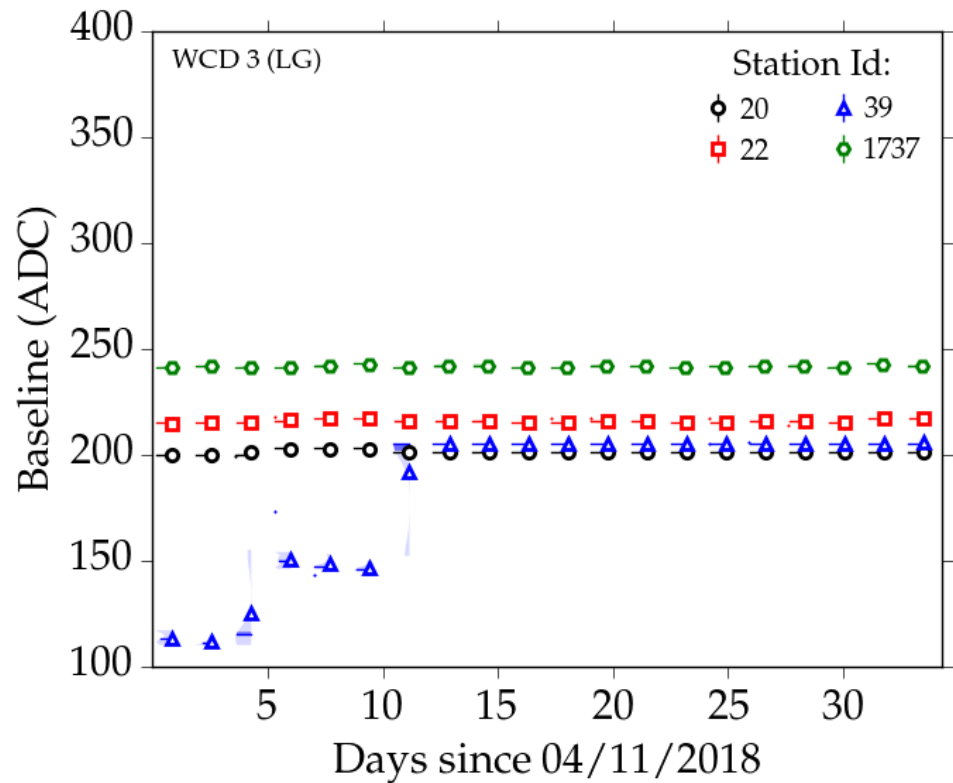
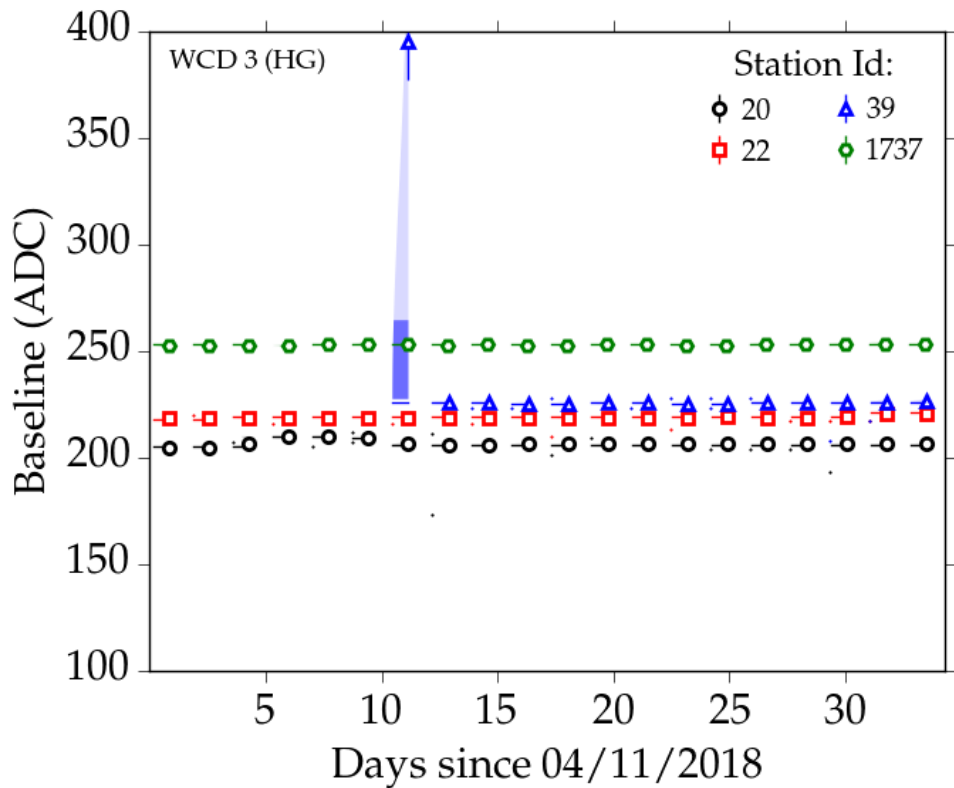
Baseline vs Time

Profiles of baseline over time - **WCD PMT 2**



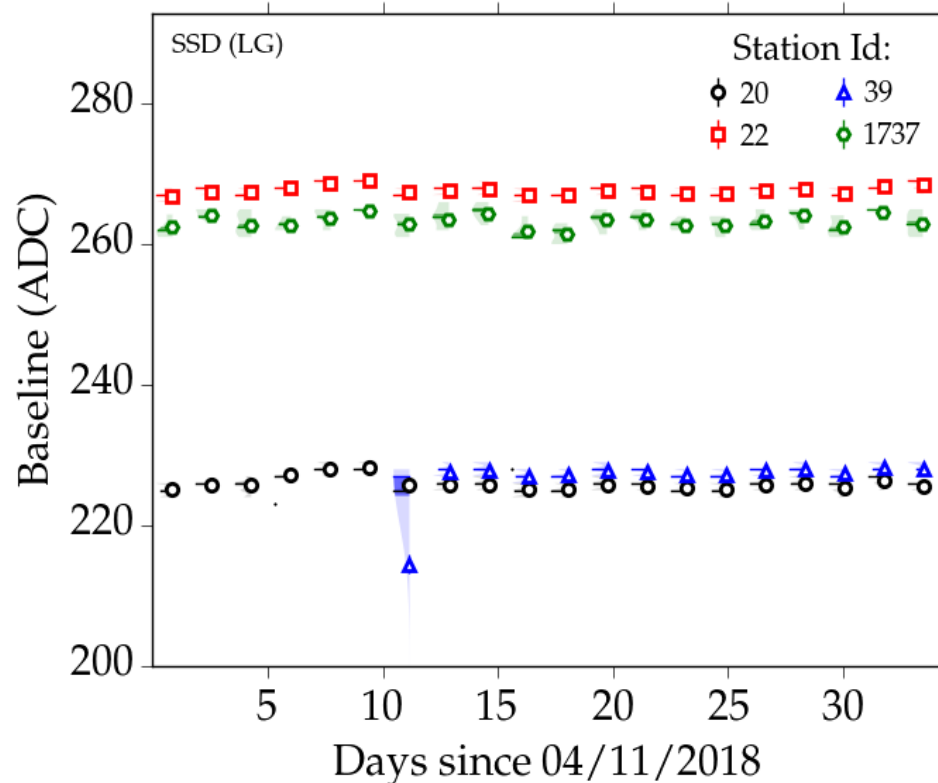
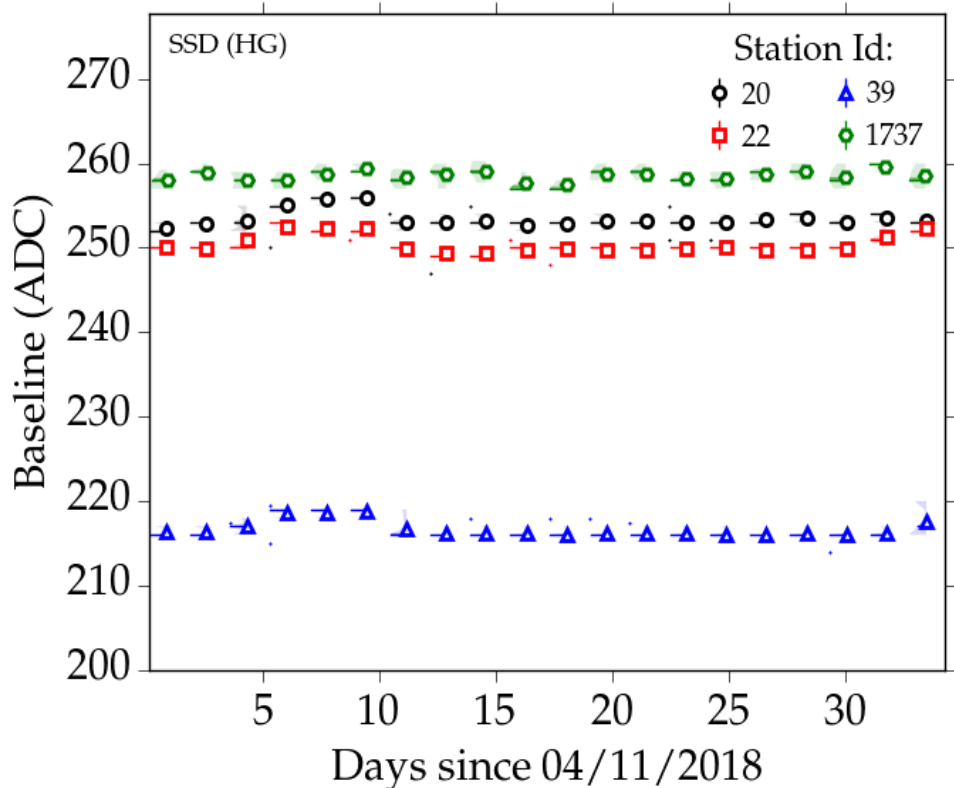
Baseline vs Time

Profiles of baseline over time - **WCD PMT 3**



Baseline vs Time

Profiles of baseline over time - **SSD**



Spikes in UUB v1 (WCD)

