



Sparking DOMs in the ORCA data



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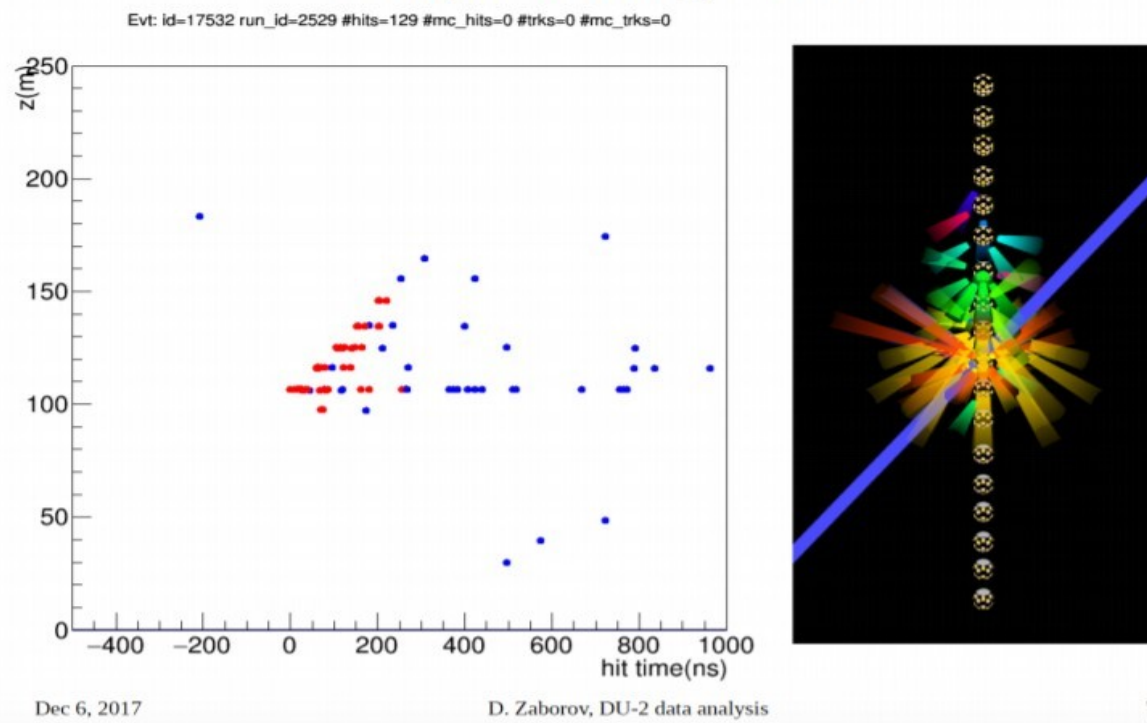
Introduction

- **Problem of Sparking DOMs is a part of the events with largest possible hit (PMT) signal (ToT255)**
- **Possible sources of ToT255 signals**
- **We have selected ORCA6 events with at least one ToT255 signal (ToT255 events).**
- **Preliminary analysis of ORCA6 ToT255 events from 846 runs**
- **Summary and Outlook**

Sparking DOM problem

- Jannik Hofestadt and Dorothea Samtleben
Report on problems with data from ORCA-DU2(KM3NeT DUANA 2019 001)
March 12, 2019
 - - PMT/DOMs signals with max. ToT (255 nsec) and repetitive hit pattern
 - Large signal on neighbouring DOMs
 - Different pattern on different DOMs

Example of strange event

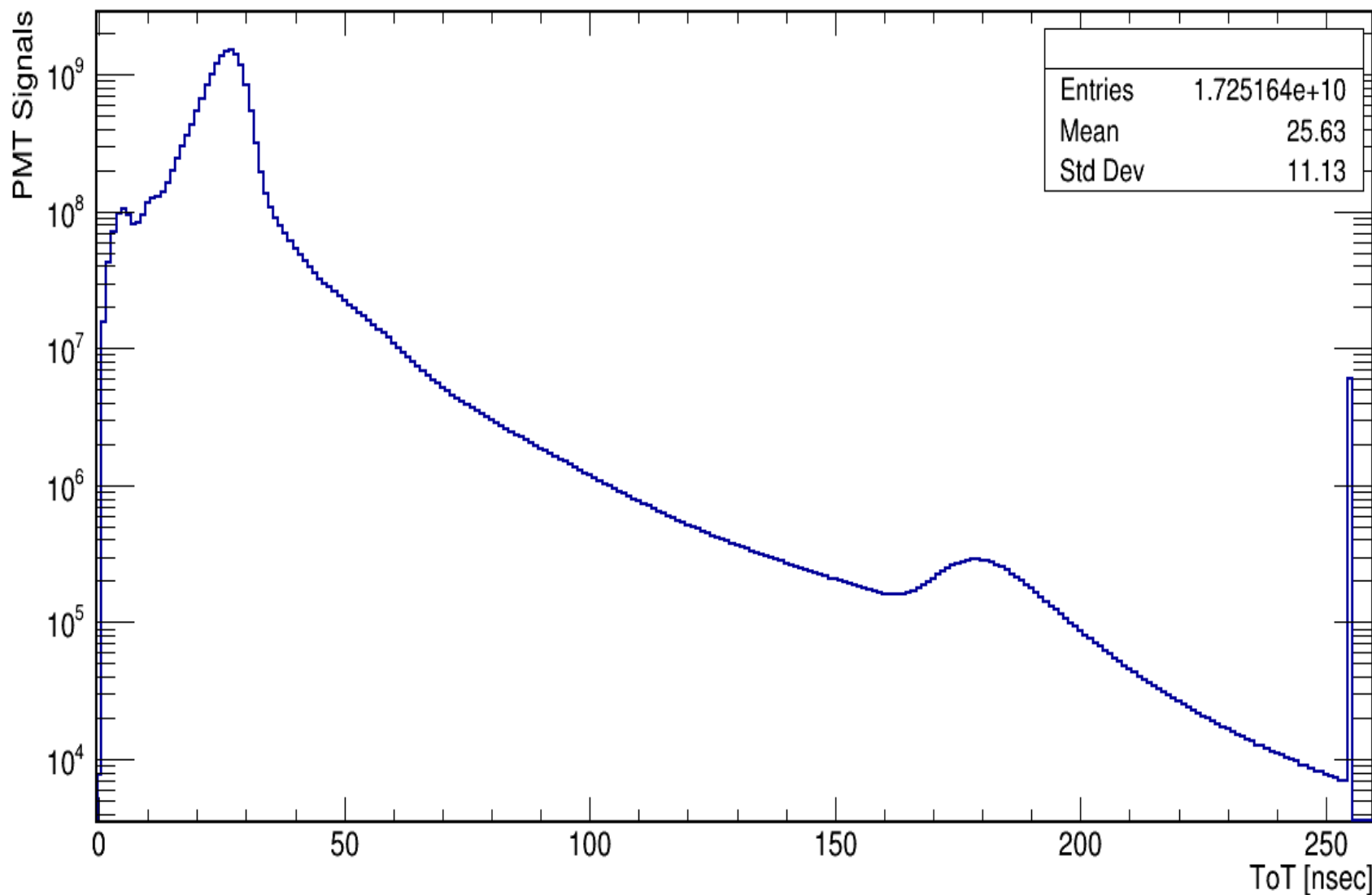


How to identify “sparking DOMs” in the ORCA4 data?

Start with events where DOM/PMT signals are maximum (255 nsec)

ToT Signal in the ORCA6 events

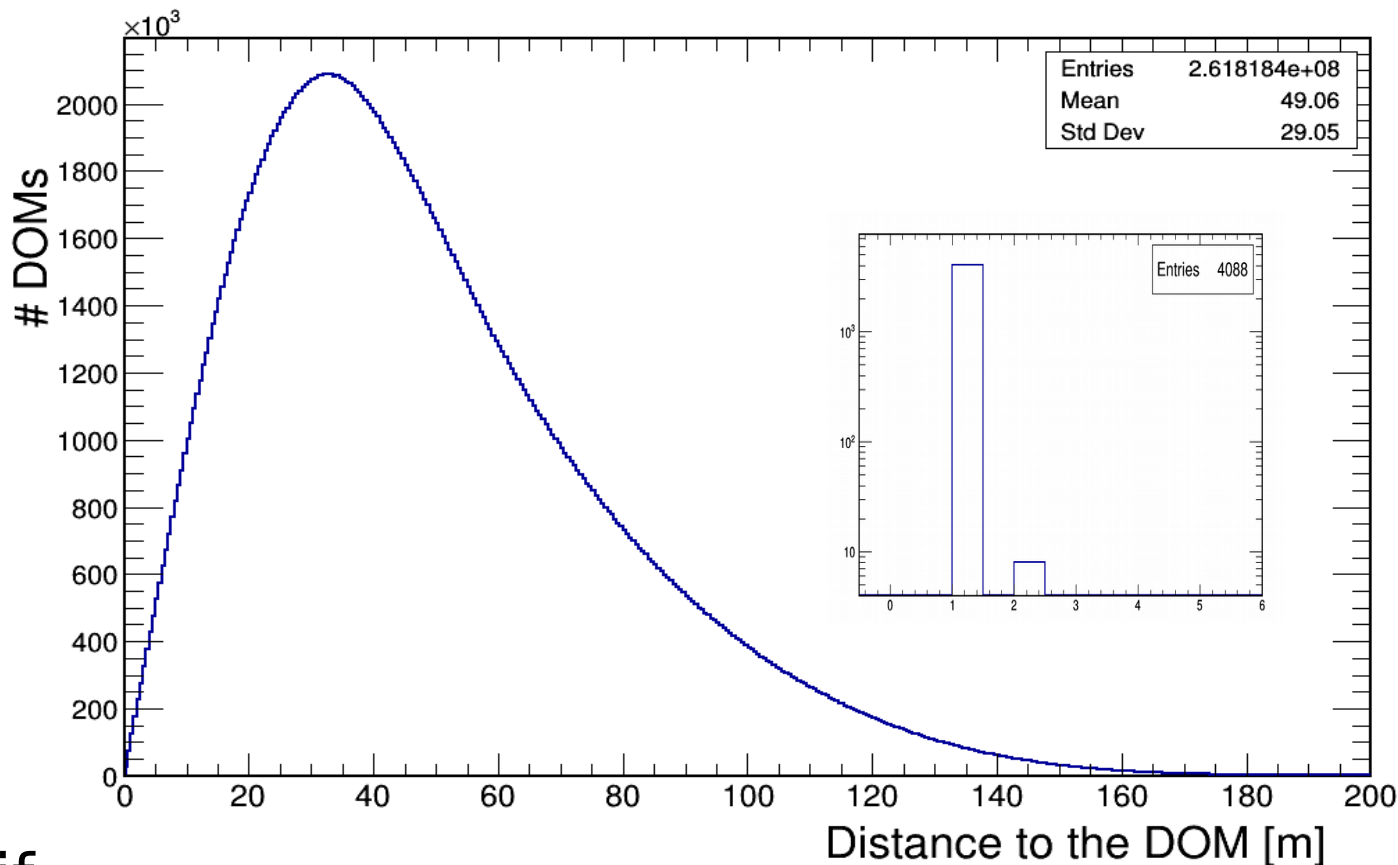
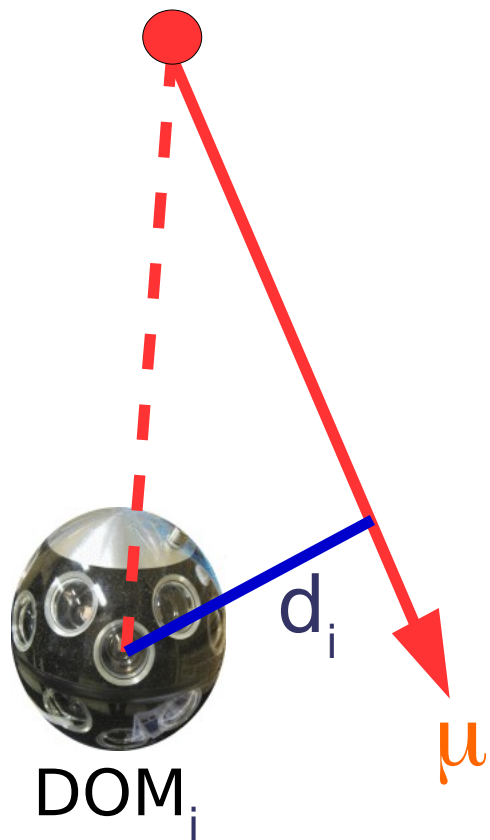
All processed events: 117 136 924 (1.2×10^8 events)



ToT255 event: events with at least 1 hit with ToT=255 nsec

Muon to DOM Distance

3.6×10^6 events (MC: mupage-sirene)

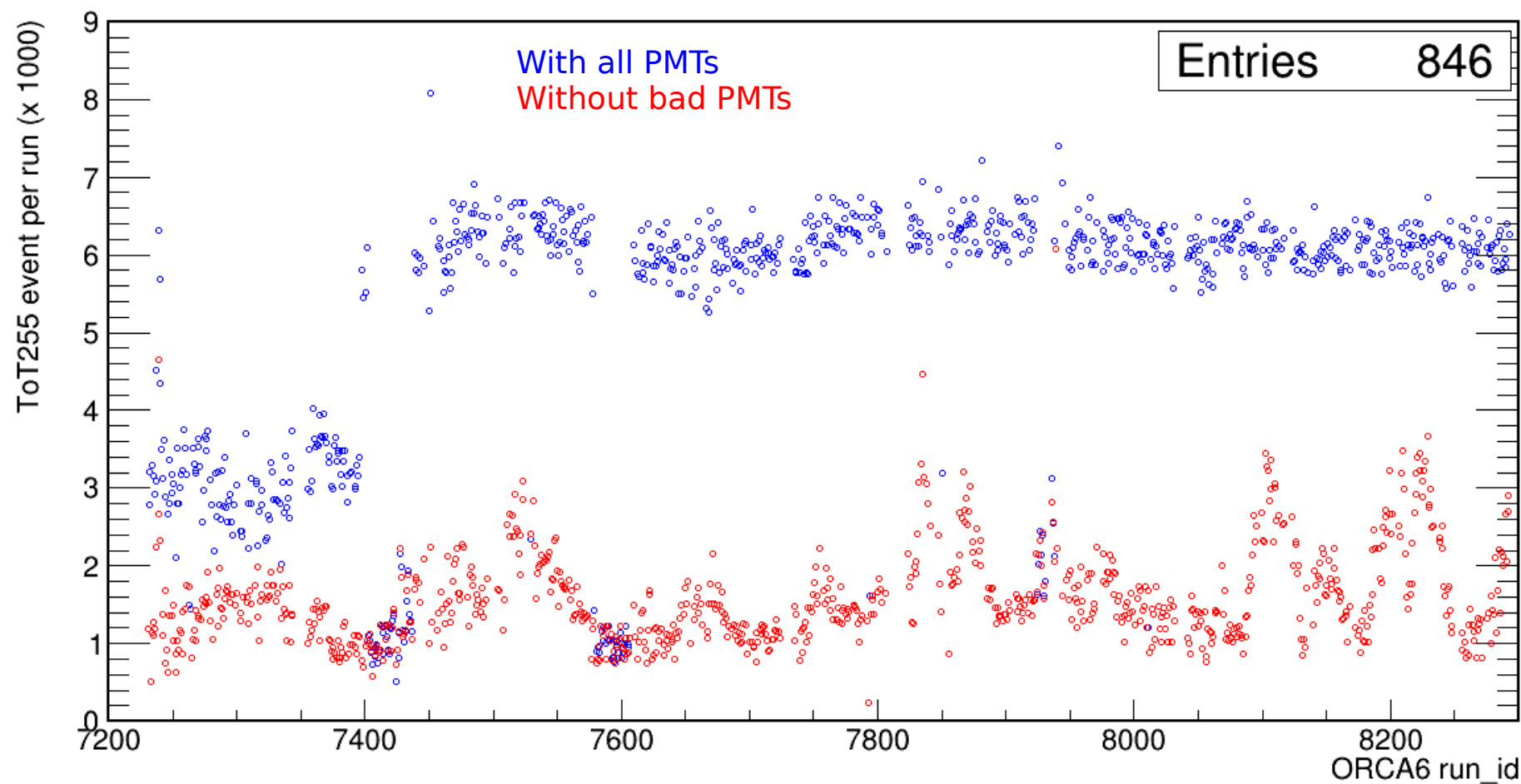


μ is crossing DOM_i if

$$d_i < R_{\text{DOM}} \text{ (20 cm)}$$

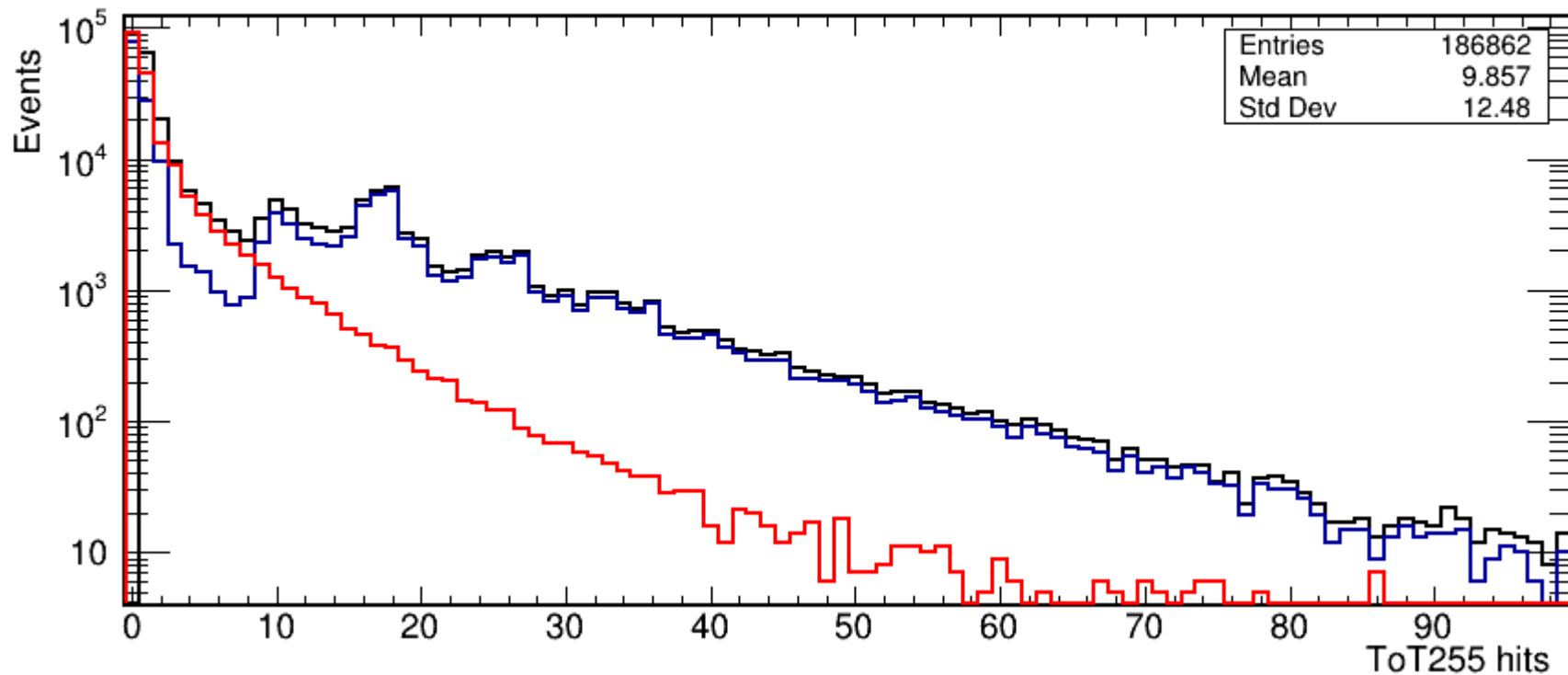
4088 events with atm- μ inside the DOM (about 10^{-3})

ToT255 Event Rates/Run



See the Bad PMTs in Juergen Brunner's [talk](#)

ORCA6 ToT255 Events

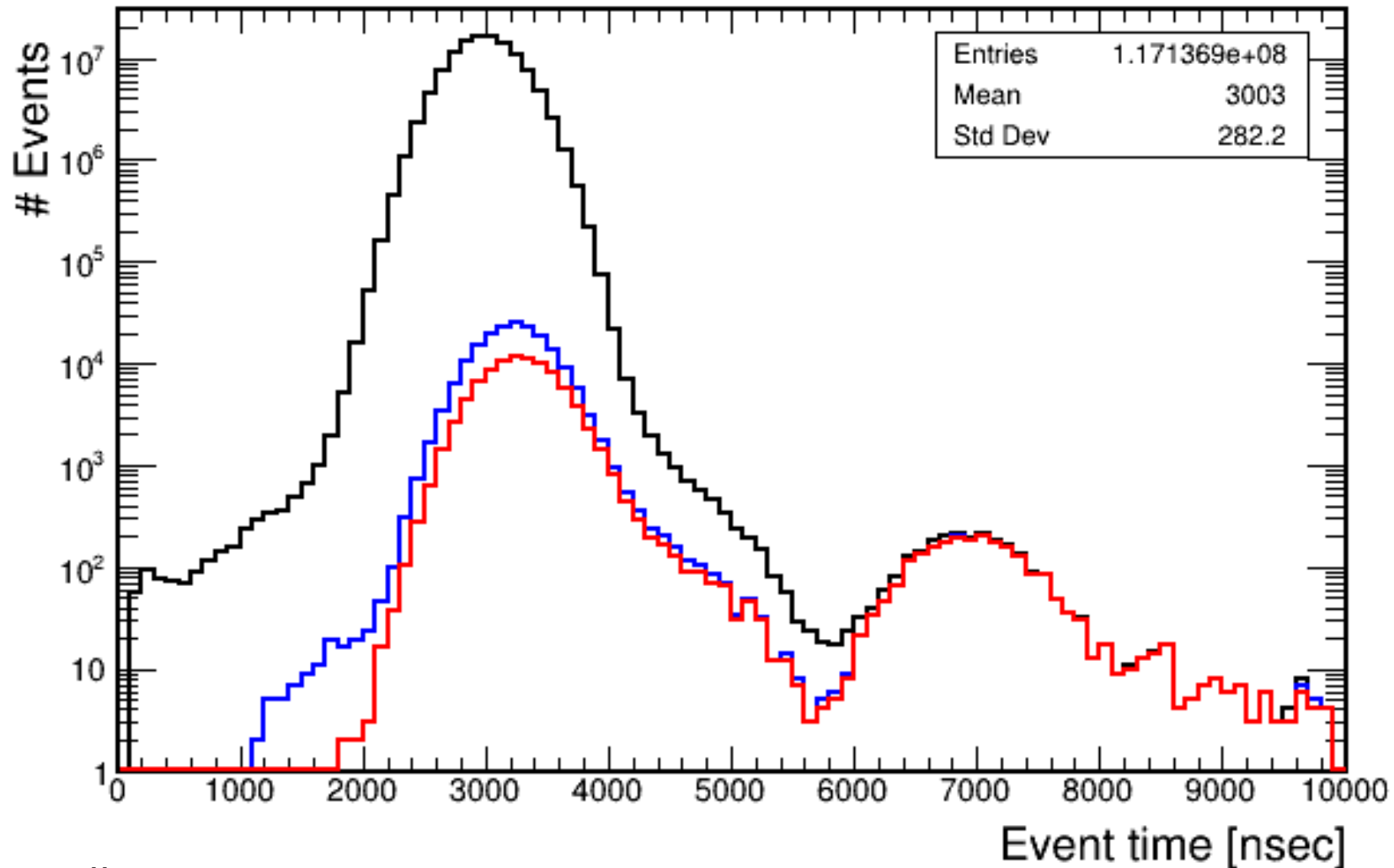


All ToT255 events

Events with ToT255 hits without trigger

Events with at least one triggered ToT255 hit

ORCA6 Event Time

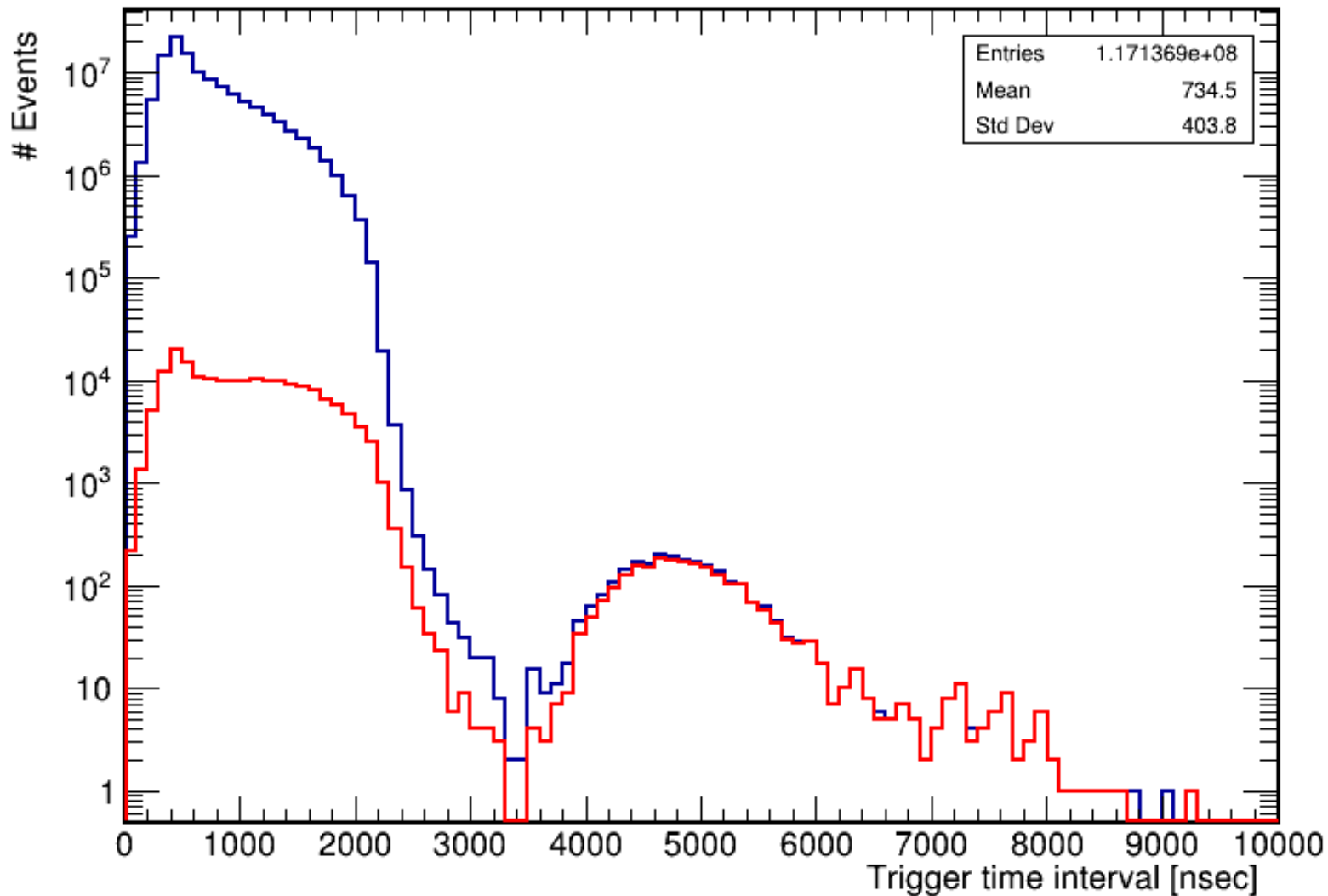


All events

Events with at least one ToT255 hit

Events with at least one triggered ToT255 hit

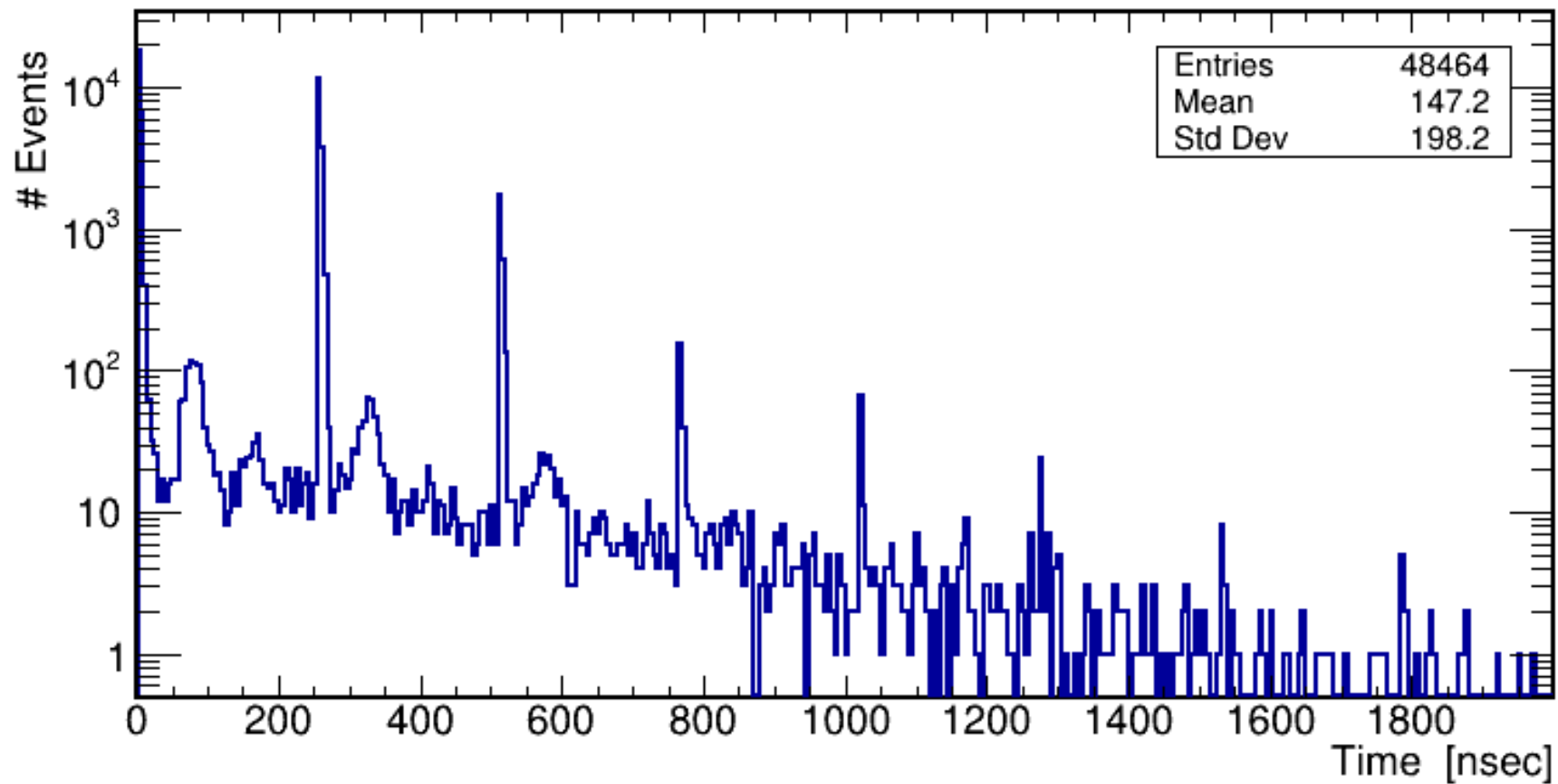
ORCA6 Event Time



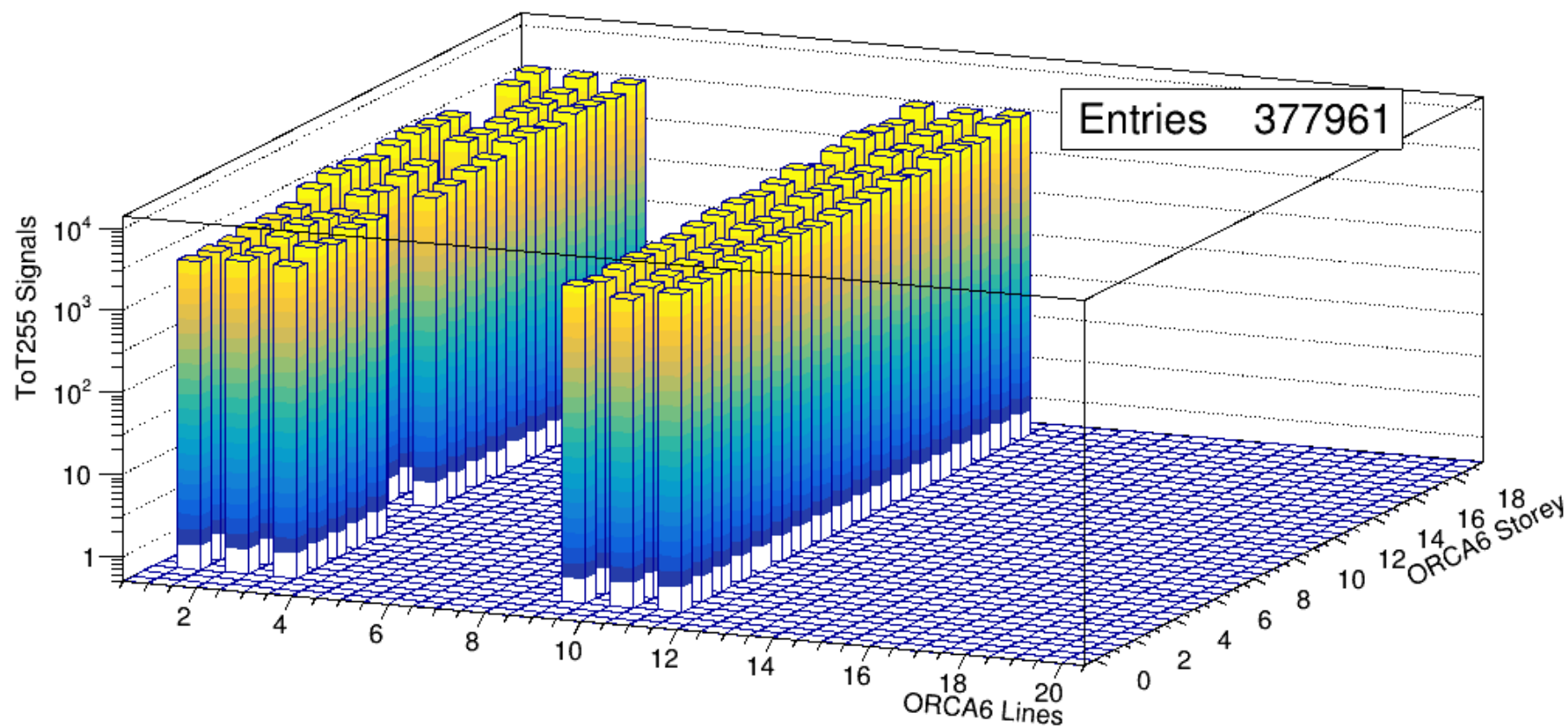
All events

Events with at least one triggered ToT255 hit

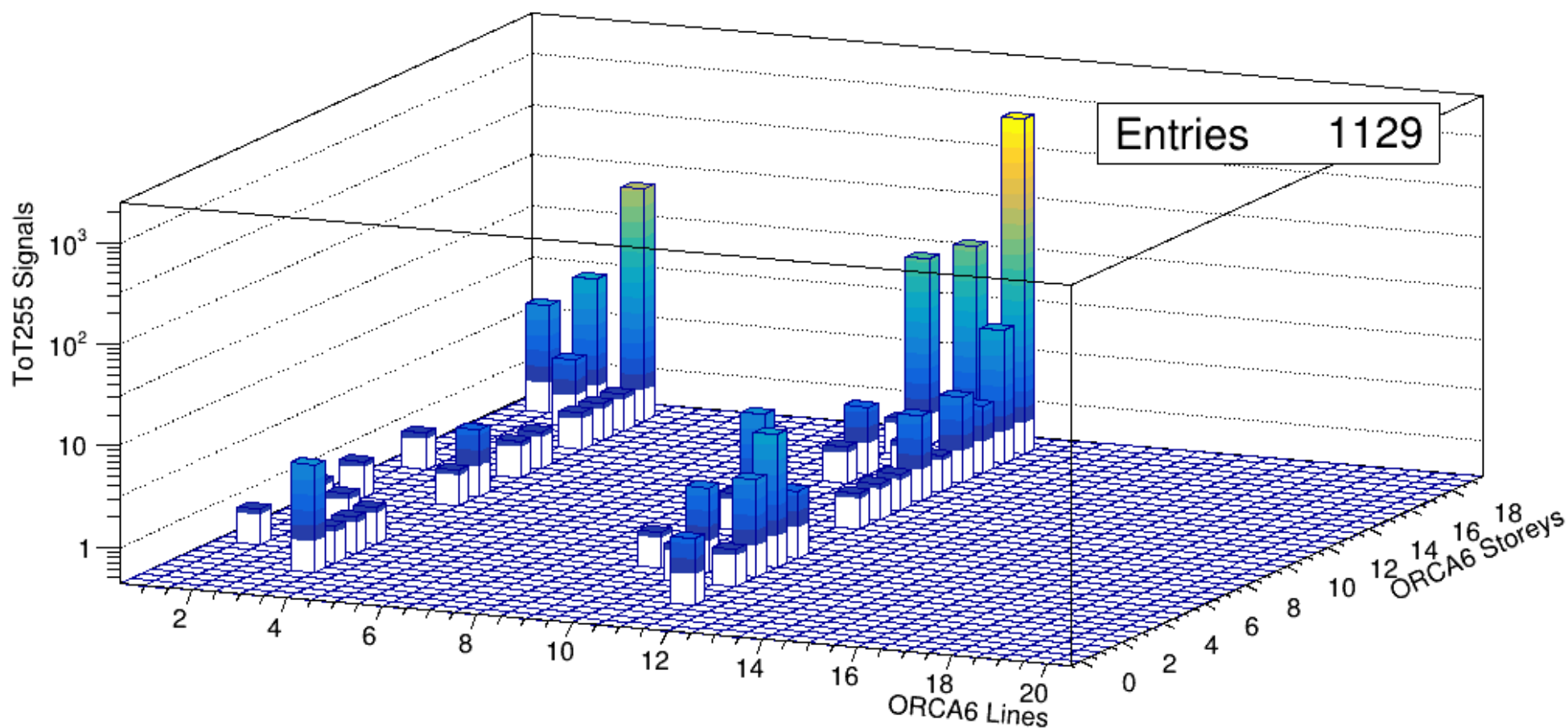
Time between ToT255 hits



Triggered ToT255 DOMs



Triggered DOMs for events with first ToT255 hit



Summary and Outlook

- We are investigating events with ToT255 hits
- Bad PMTs are excluded for this analysis
- Further studies of ToT255 events are needed for better understanding and identifying its sources
- Identification of sparking DOMs
- Notes to be written