Spark study status

"A never ending emotional rollercoaster"
Valentin Pestel - 10/12/2020
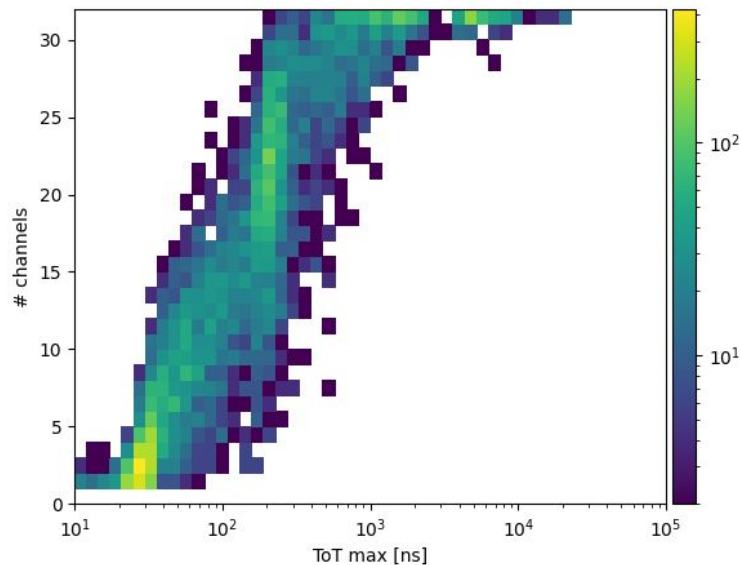
Moving to JPP/km3io

Code available on git : https://git.km3net.de/vpestel/spark-x
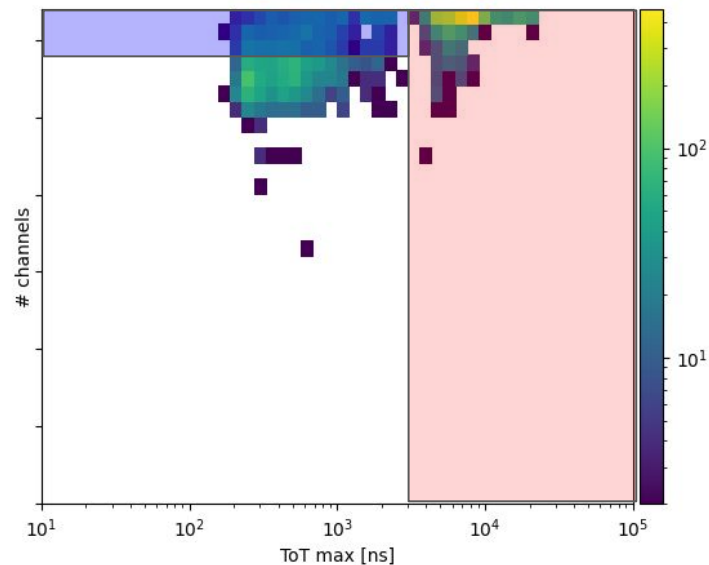
- JPP (JTriggerProcessor) to reconstruct events on the L0 hits
  - L2.numberOfHits= 25
  - L2.TMaxLocal_ns= 30
  - ~ 4-5 event / minutes / DOM
- Python script (km3io based) to cut refine selection
  - Merge ToT per events
  - Select the DOM :
    i. Sum ToT per DOM, select the largest
    ii. DOM1 -> larget, DOM2-> second largest etc …

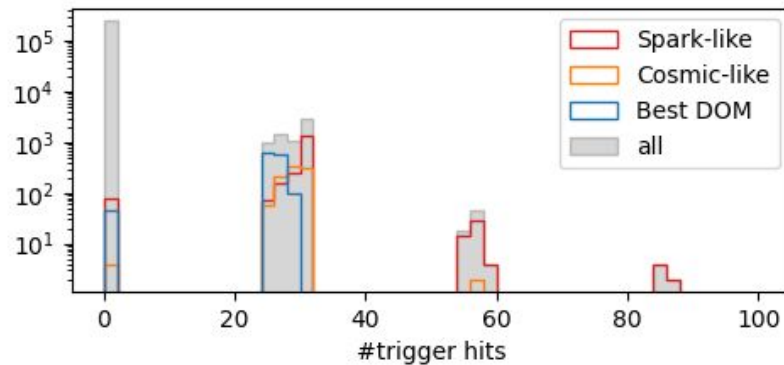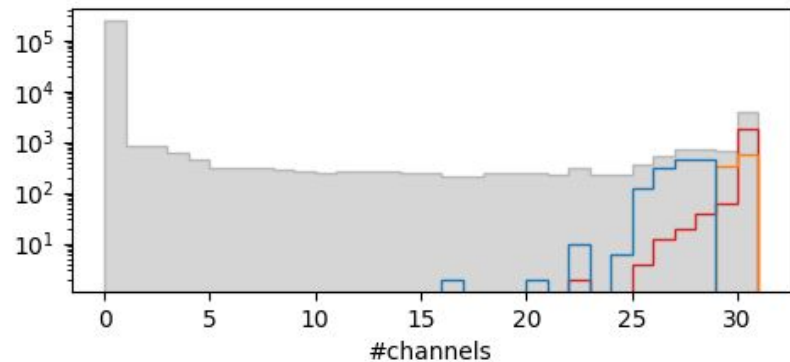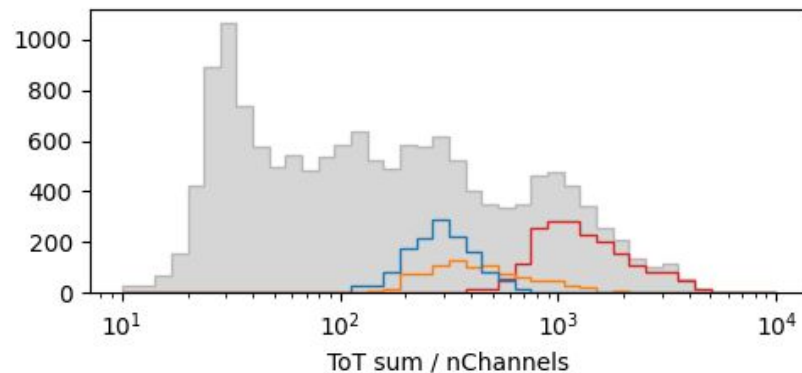# JTriggerProcessor output (after ToT merging)
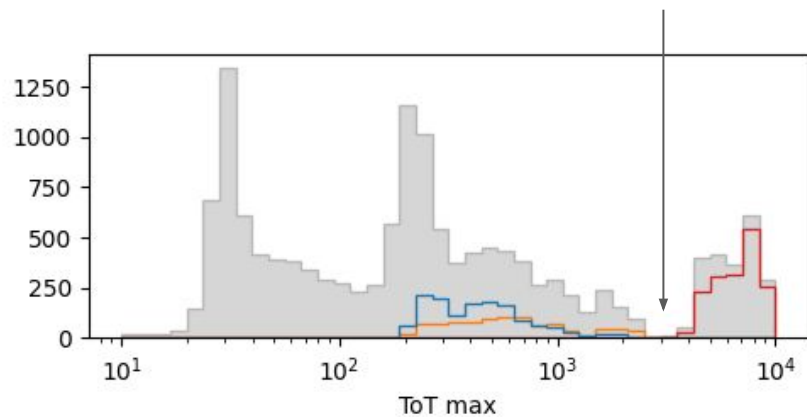

Other DOMs

Largest ToT DOM
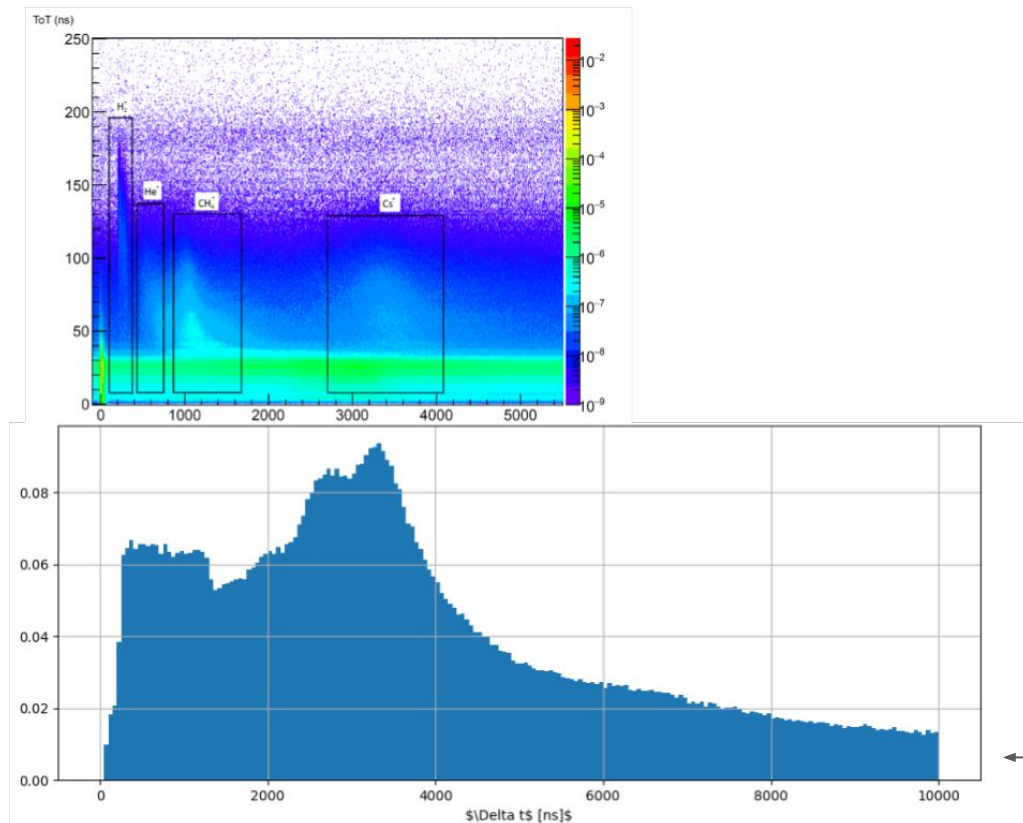
Spark-like   ToTmax > 2700ns
Cosmic-like   ToTmax < 2700ns & nChannels >=29

1D distribution

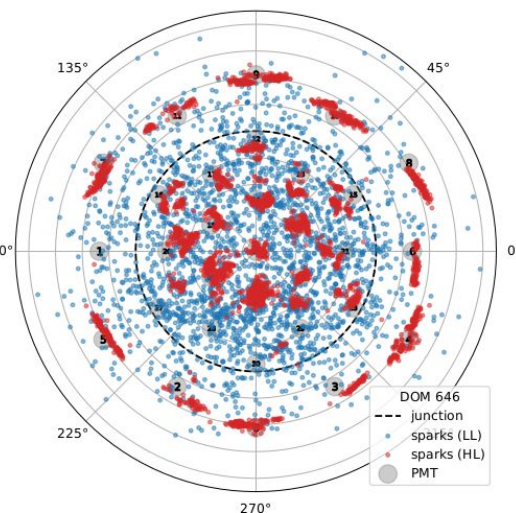Why this gap ?

Afterpulses

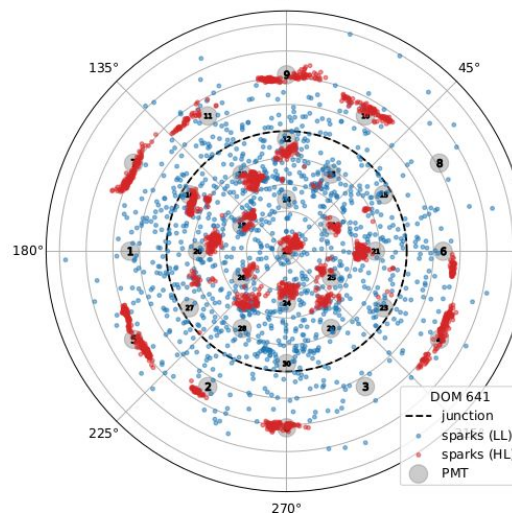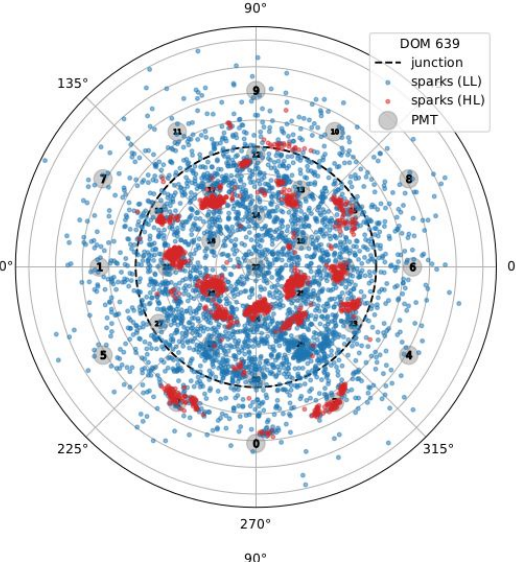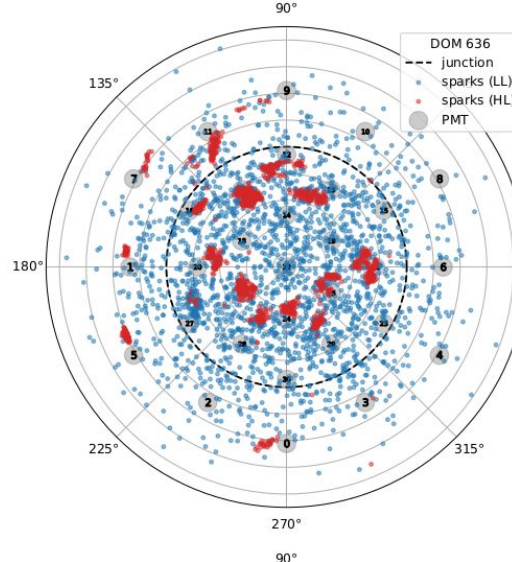**Large contribution of Cs⁺ afterpulses (~ 3.3 us) :**

- Could explain the gap on the ToT max
  - If first signal ToT < 2.7us, cross 0 before afterpulses
  - If first signal ToT > 2.7us, very large probability to not cross 0 before afterpulses

Δt after >100ns ToT hit (all Δt, not closest hit)
Normalised to the number of >100ns ToT

Spark rate time evolution

Spark position (kinda)

Compute ToT barycenter, project on the sphere.

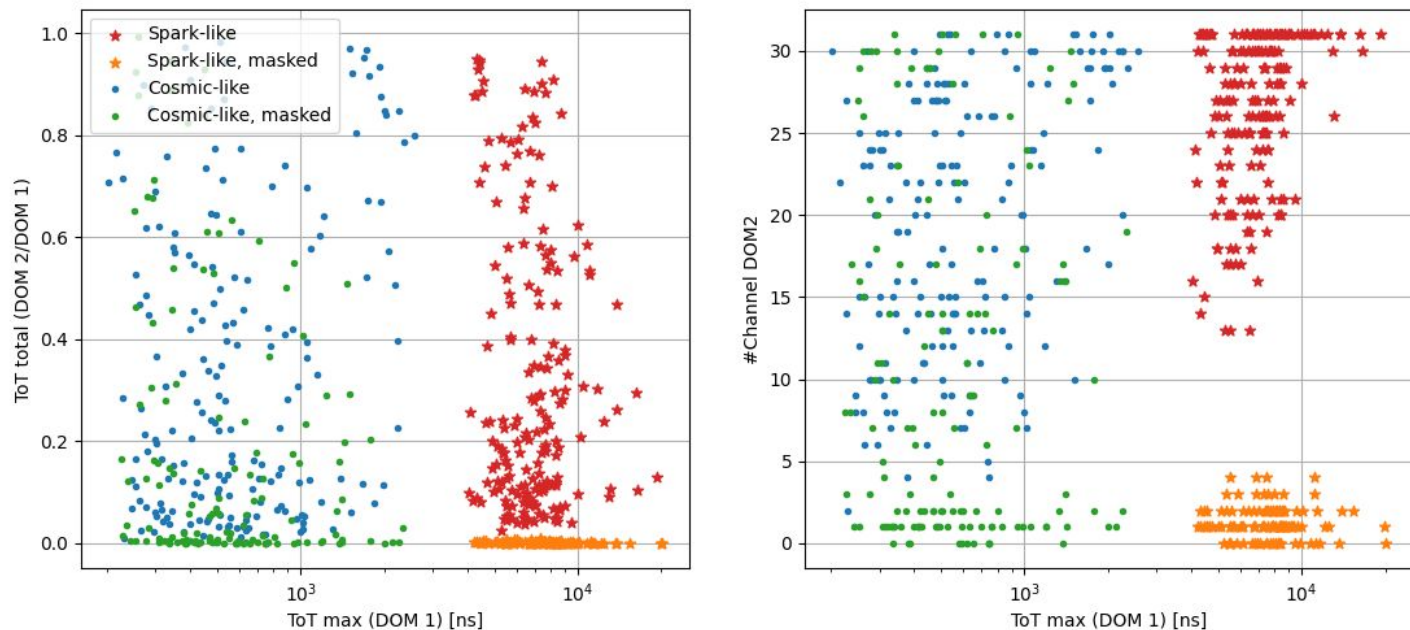**Cool plots, still not sure it's useful …**

The "hoodies" test
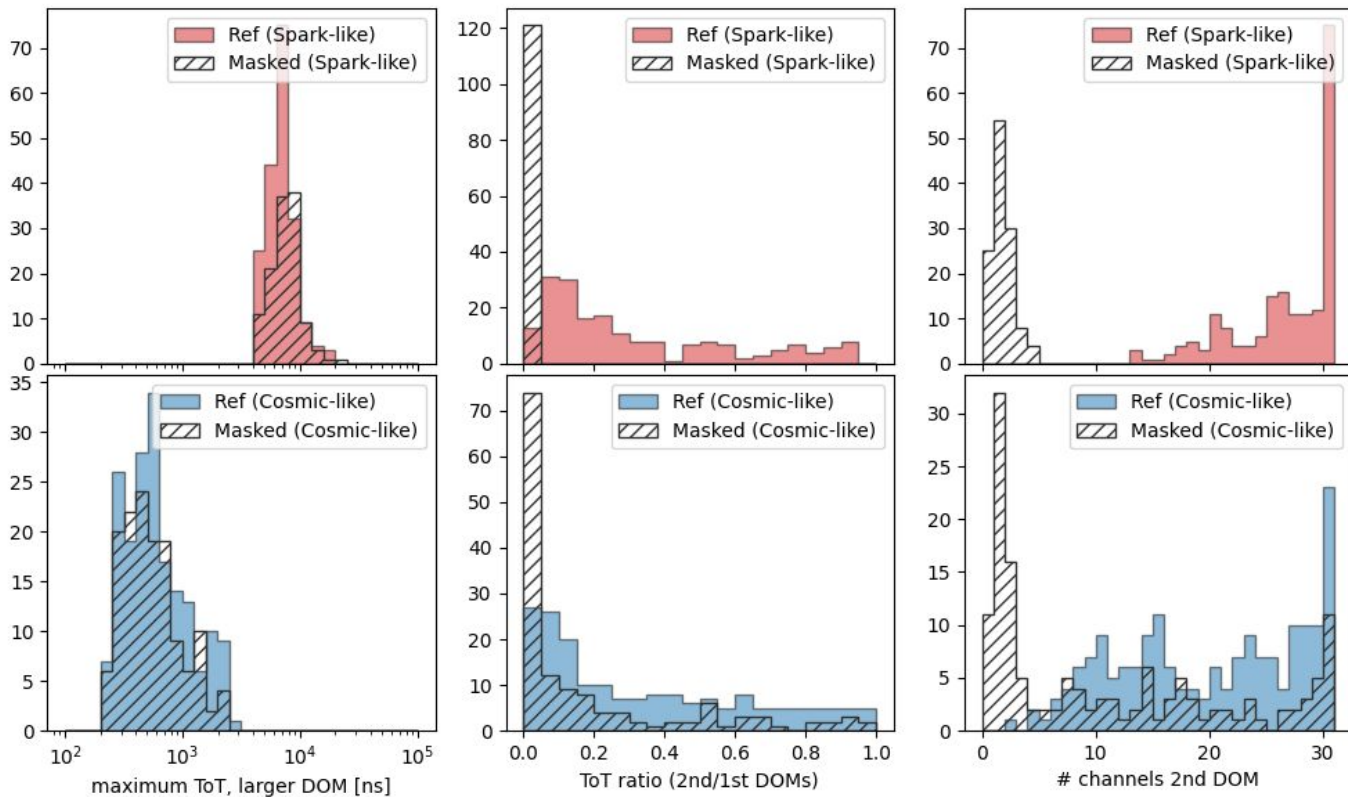
Brían cover the DOMs on last Friday
- All the DOMs insulated from other DOMs light
- Obviously not isolated against cosmic
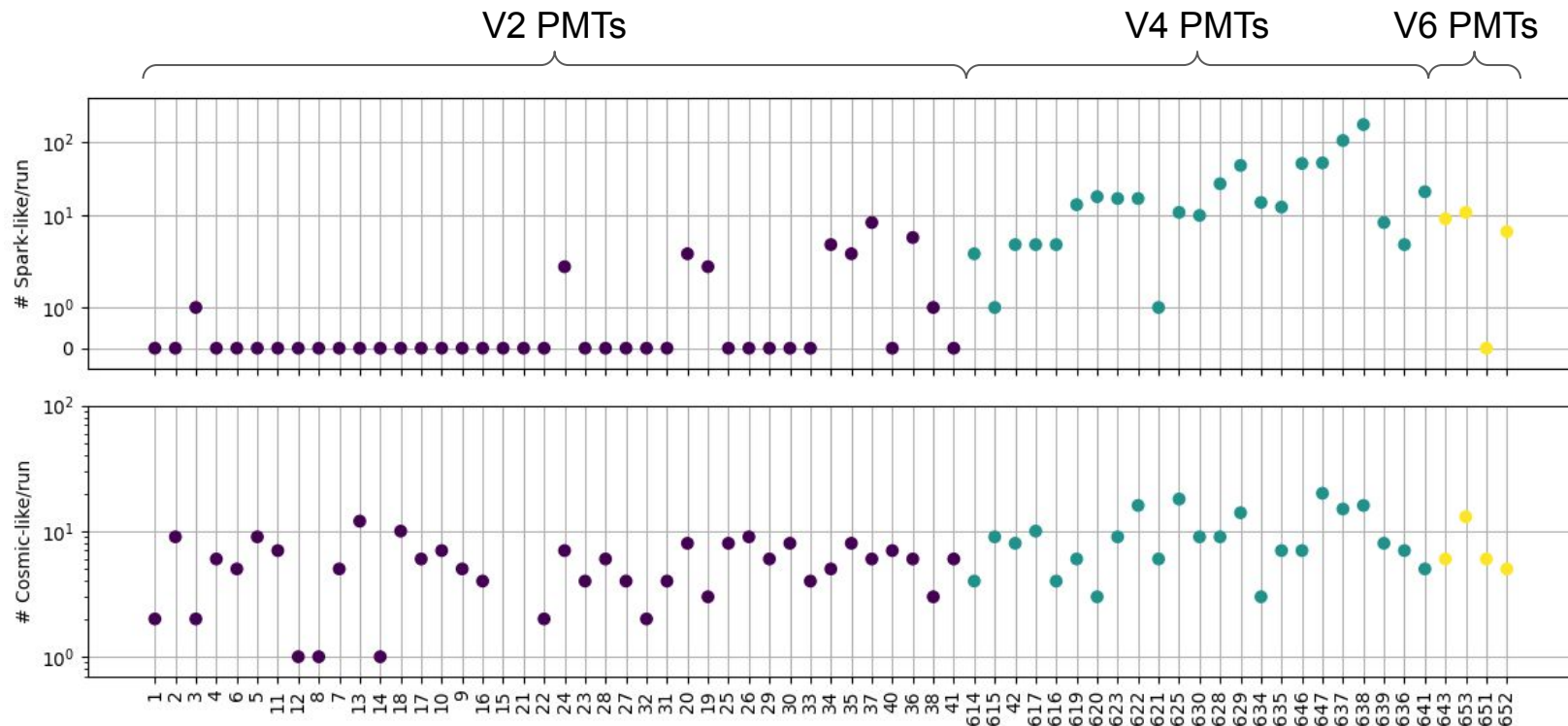
A first look at light transfer between DOMs

Spark-like events are totally contains in one DOM with hoodies, as expected.
Cosmic-like events are still shared in multiple DOMs (but …)

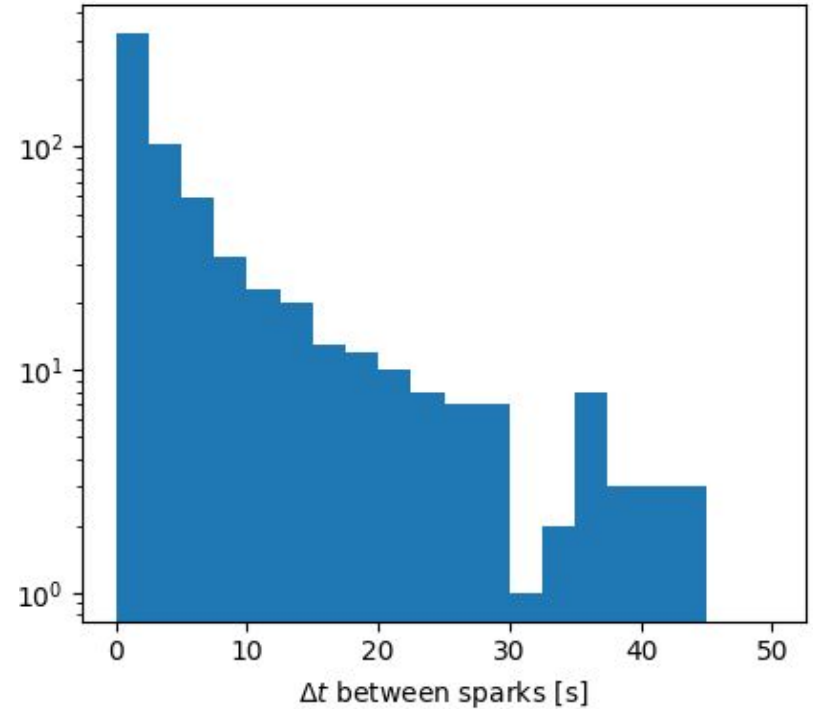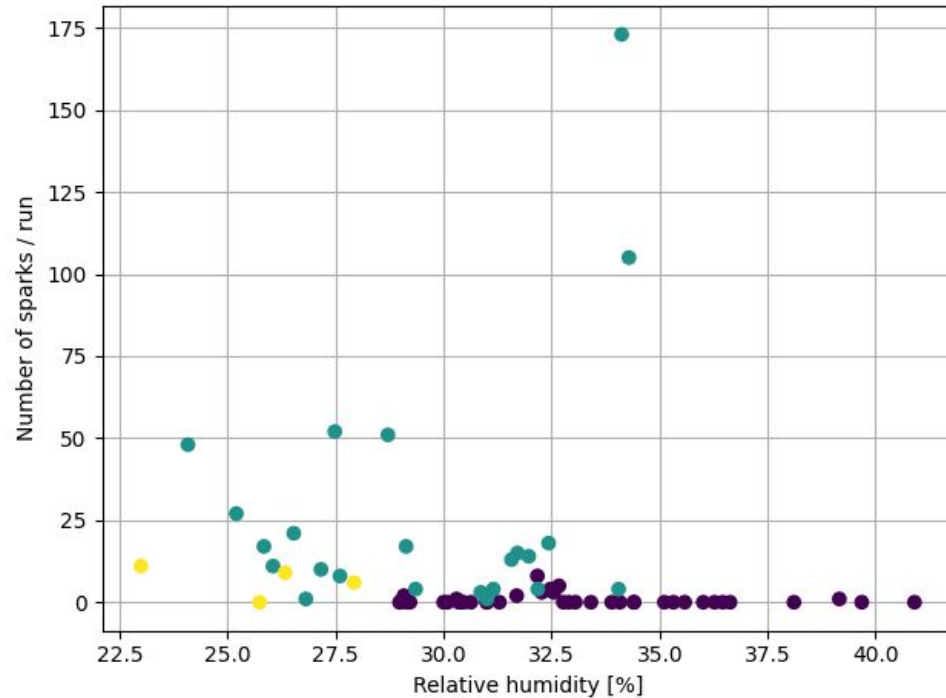# A first look at light transfer between DOMs

Effect of the selection on Acceptance tests results

Still sparks with V6 PMTs ?! Also, probably still some sparks in the cosmic-like events

Refresh other plots ...

Humidity ? No obvious periodic behavior ...

Conclusion

Spark selection can be improved

- But still very close
- Is the spark positioning working ? how accurate?

Spark rate decrease with time

- Is it reversible ? Still some test to do.

PMT V6 still showing sparks ?

- What did we miss ?