

Status Report

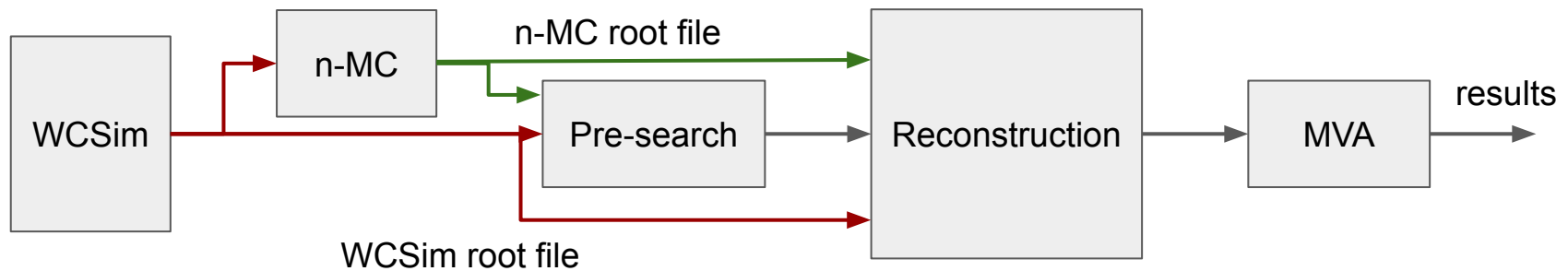
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28 Aug. 2020

HK mPMT Japan meeting

Update

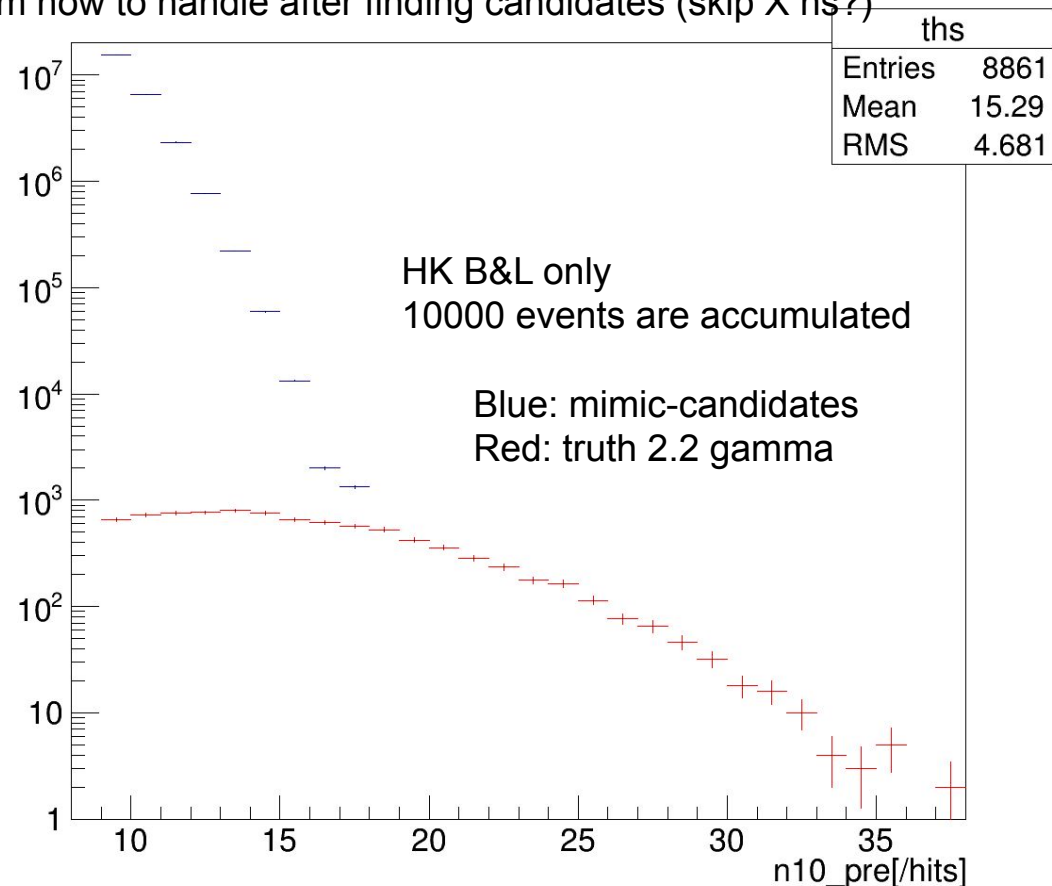
- N-tagging framework:
 - All stages were implemented, but they have some issues.
- MC:
 - (new) HK 40% photo-coverage 20 inch B&L w/o mPMT
 - 20 inch B&L PMT: 40,000 (darkrate = 8.4 kHz)
 - N10 threshold = 9 (tentative)
 - mPMT hybrid
 - 20 inch B&L PMT: 20,000 (darkrate = 4.2 kHz)
 - mPMT: 10,000 (darkrate of 3 inch PMT = 100 Hz)
 - N10 threshold = 6 (tentative)
 - Particle: 2.2 MeV gamma-ray, 10,000 events
 - Flat in whole tank, isotropy.



Tools and file flow (plan)

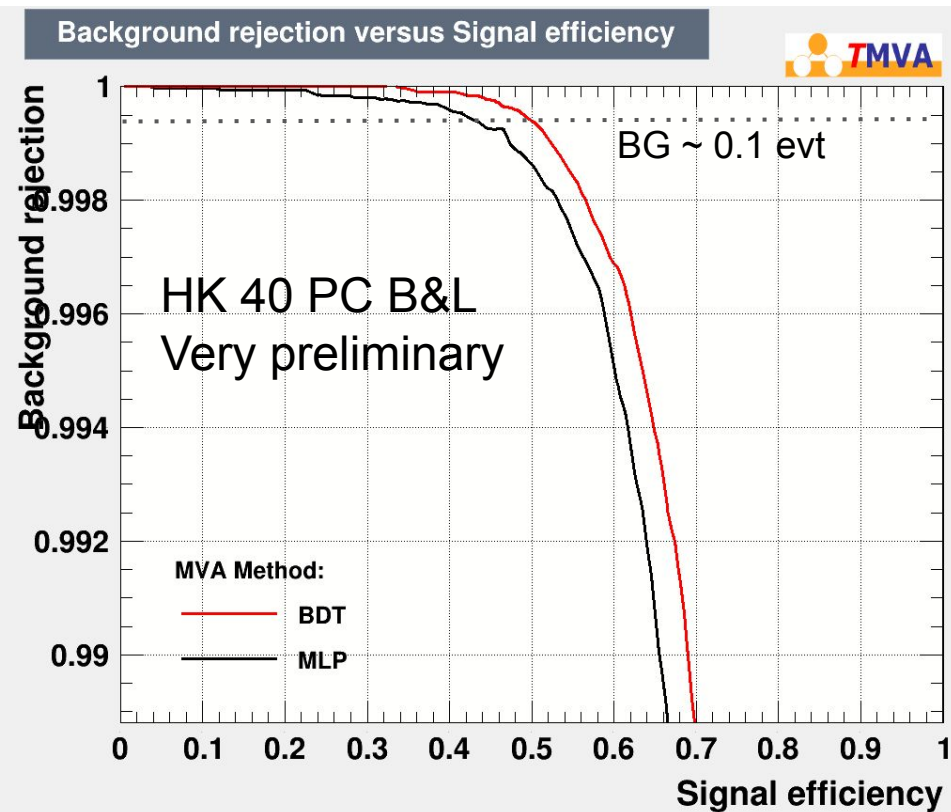
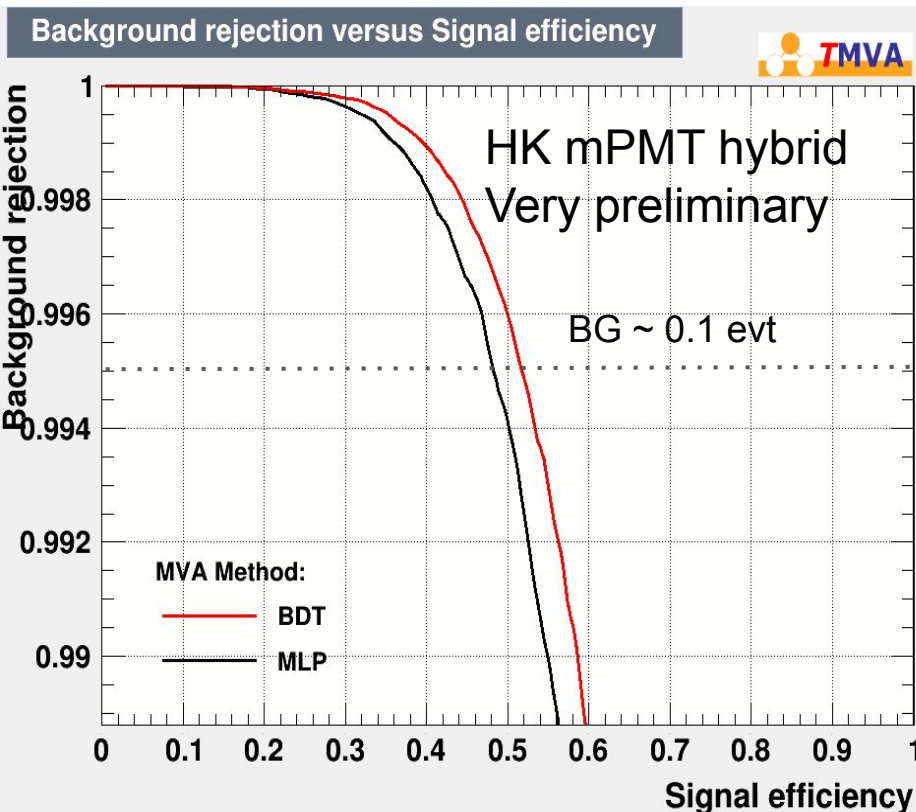
N10 pre-search

- # of found candidates of N10 search was higher than expected
 - # of mimic candidates / 1 neutron $\sim$ 2,500 candidates
 - Expected = PoissonPDF(DR=8.4kHz, $n_{10} \geq 9$ hits)
 $\times 1$ ms (search window) / 10 ns (n_{10} window) $\sim$ 1000 candidates
 - Am I misunderstanding something?
 - Okajima-san's case: $\sim$ 30 fake candidates in 1 neutron ($n_{10_thr} = 9$)
 - Might be this difference came from how to handle after finding candidates (skip X ns?)
 - Here I skipped 20 ns.
- And I need to require
 0.01% BG rejection for
 0.1 mimic signal / neutron
 - This is not good
- I am now investigating



Multivariable Analysis

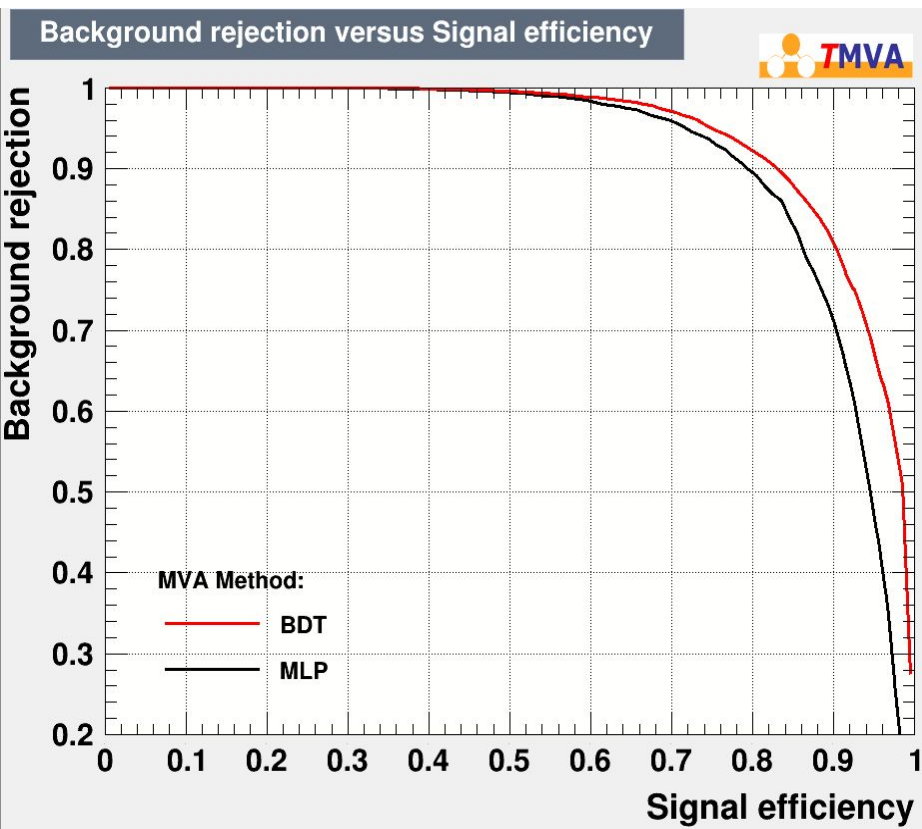
- Now I am adding variables and fixing the bugs.
 - And I need to investigate problem around n10-search.
- Very preliminary plots
 - Here mPMT case has better performance, but this is because I did not choose proper working points.
 - Furthermore,



Plan

- Check some unclear behaviour about N10 search
 - Confirm appropriate implementation
- Tune working points and evaluate n-tagging performance for each configuration.

mPMT hybrid



B&L only (40PC)

