



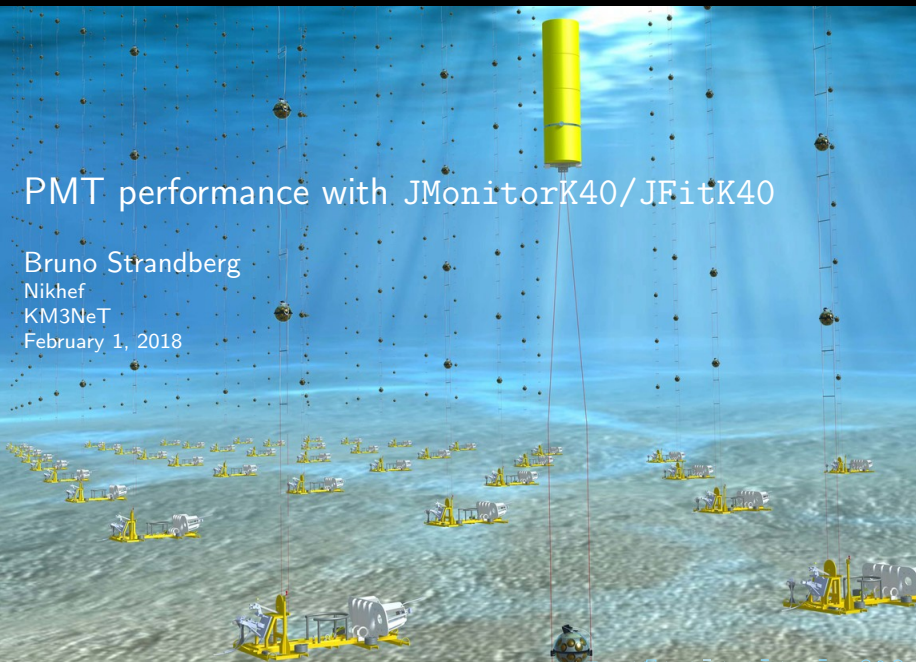
PMT performance with JMonitorK40/JFitK40

Bruno Strandberg

Nikhef

KM3NeT

February 1, 2018



Outline

- 1 Introduction
- 2 Comparison to km3pipe
- 3 Detector performance
- 4 The JMonitor software
- 5 Summary/Outlook

Introduction

Purpose: time and efficiency calibration of PMTs in sea.

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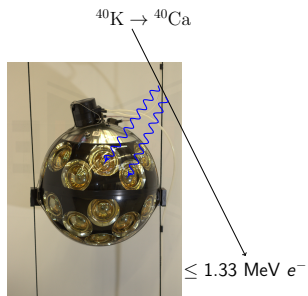


Figure: Illustration of a coincidence from ^{40}K decay.

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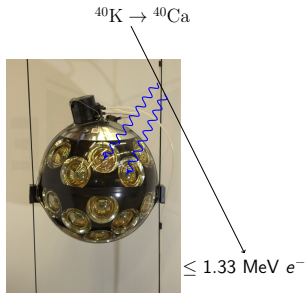


Figure: Illustration of a coincidence from ^{40}K decay.

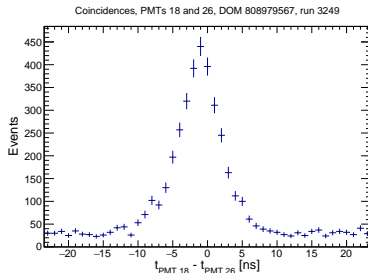


Figure: Example coincidence spectrum for ^{40}K analysis.

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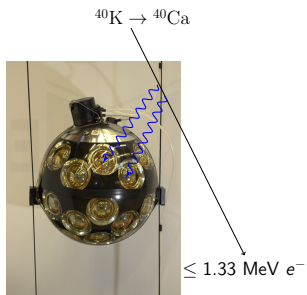


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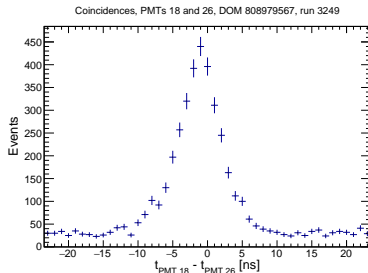


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- 31 PMTs $\rightarrow 31 \times 30/2 = 465$ spectra per DOM.

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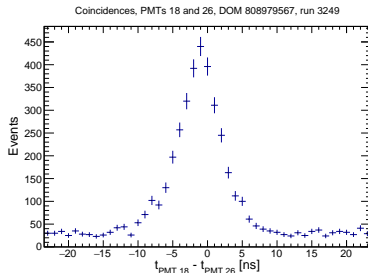
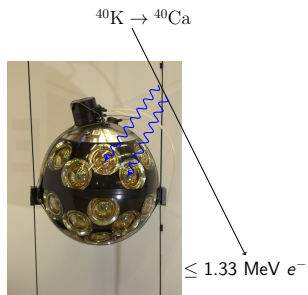


Figure: Illustration of a coincidence from ^{40}K decay.

Figure: Example coincidence spectrum for ^{40}K analysis.

- 31 PMTs $\rightarrow 31 \times 30/2 = 465$ spectra per DOM.
- In Jpp, a simultaneous fit of the 465 spectra $\rightarrow t_0$, TTS and RE of each PMT in DOM.

Comparison to km3pipe - time

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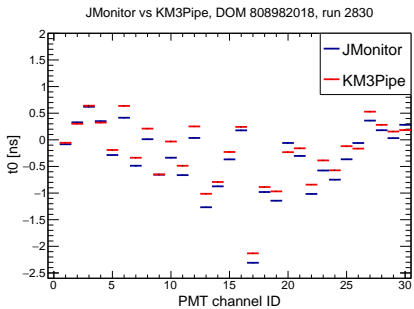


Figure: Comparison of t_0 's by PMTs.

Comparison to km3pipe - time

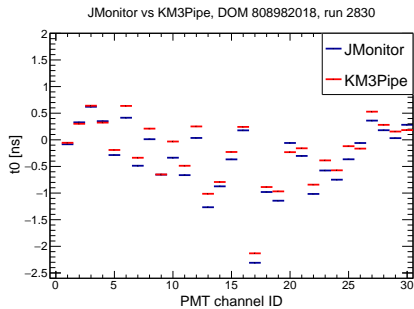


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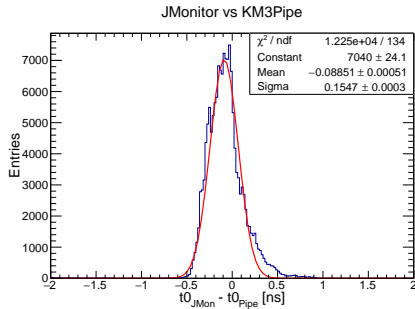


Figure: $t_{0\text{JMon}} - t_{0\text{Pipe}}$ over ~ 200 runs.

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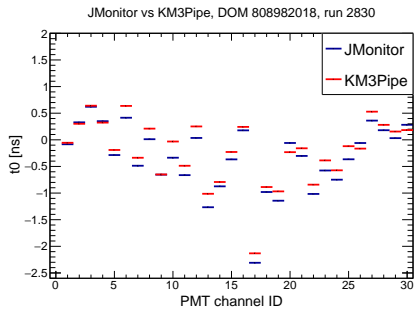


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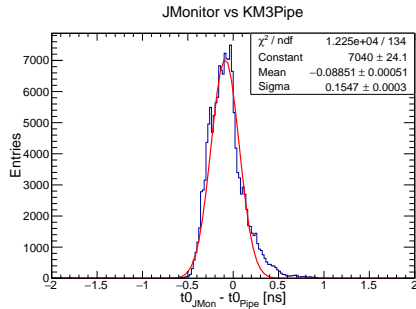


Figure: $t_{0_{JMon}} - t_{0_{Pipe}}$ over ~ 200 runs.

Very good agreement between time calibrations.

Comparison to km3pipe - 2-fold rate

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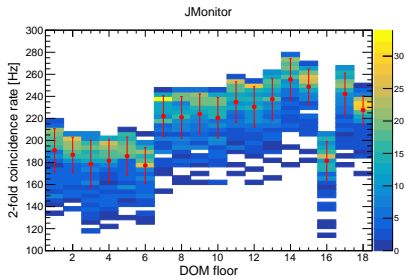


Figure: JMonitor 2-fold coincidence rate on DOM by floor.

Comparison to km3pipe - 2-fold rate

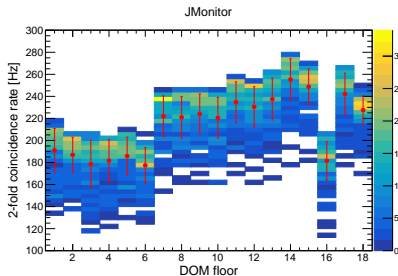


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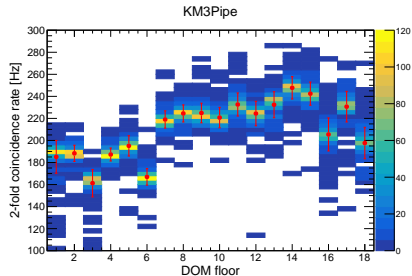


Figure: KM3Pipe 2-fold coincidence rate on DOM by floor.

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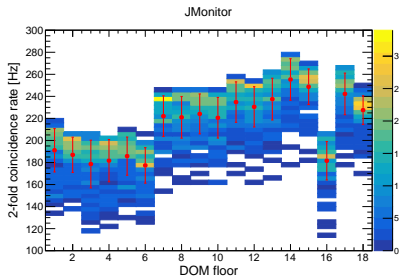


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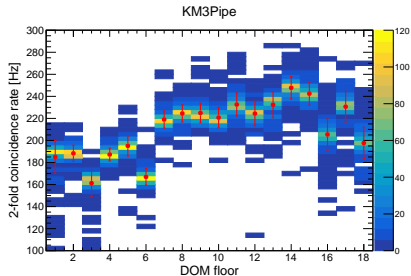


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- Different 2-fold rate on floors 1-6, 16 (and 18?).

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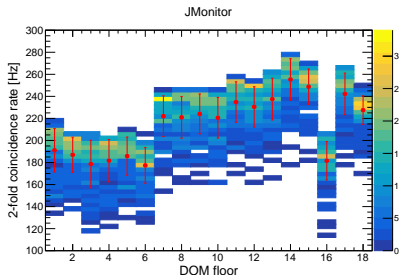


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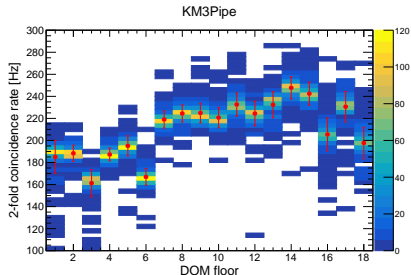


Figure: KM3Pipe 2-fold coincidence rate on DOM by floor.

- Different 2-fold rate on floors 1-6, 16 (and 18?).
- Lower rate \rightarrow lower PMT efficiency.

Detector performance - PMT eff. by floor

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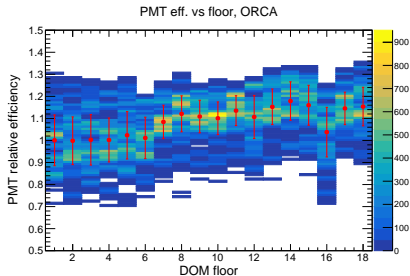


Figure: PMT efficiency by floor, ORCA runs 2867 – 3249.

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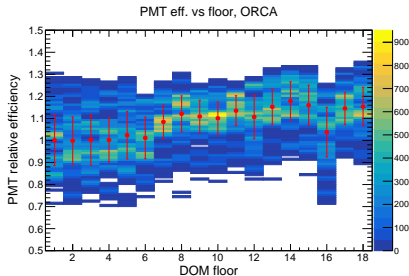


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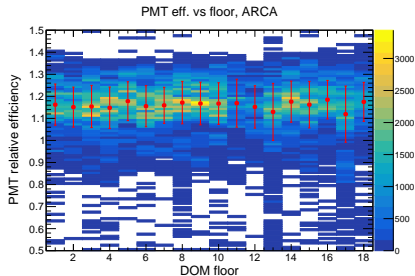


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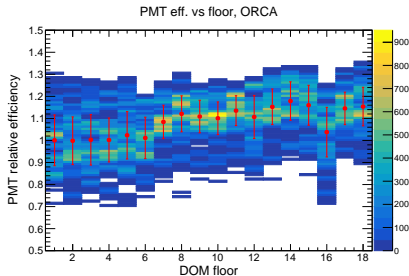


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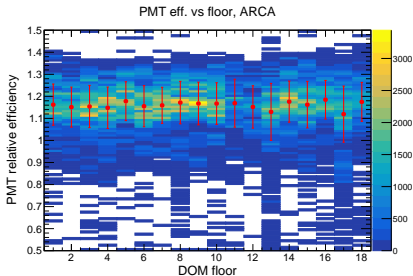


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- No such effect present in ARCA data.

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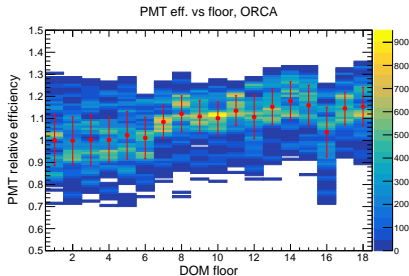


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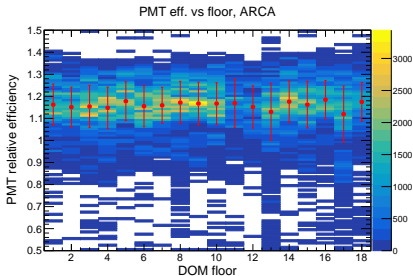


Figure: PMT efficiency by floor, ARCA runs 2774 – 5642.

- No such effect present in ARCA data.
- Indication of differences in DOMs from different sites.

Detector performance - PMT t₀ stability

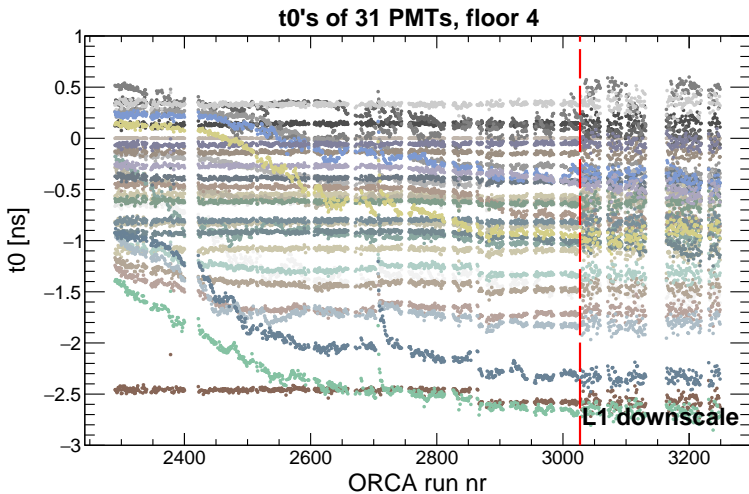


Figure: t₀'s of 31 PMTs, ORCA floor 4.

Detector performance - PMT eff. stability

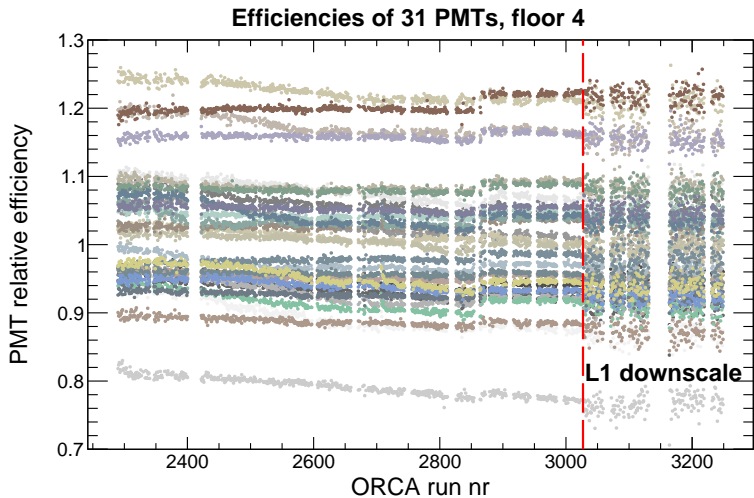


Figure: Efficiencies of 31 PMTs, ORCA floor 4.

The JMonitor software - updates

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- Documentation (start) - JMonitor.pdf.

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- Improved livetime calculation, $\sim 10\%$ impact on efficiency.

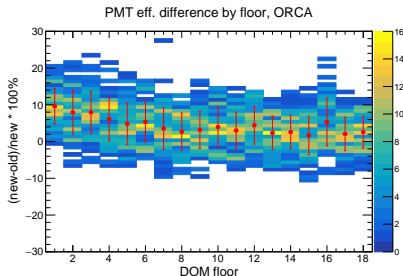


Figure: Difference in PMT efficiencies by floor. New (Jpp trunk), old (Jpp v9).

Summary/Outlook

Summary:

- JMonitor vs KM3Pipe – good agreement.
- Indication of different PMT efficiencies by floor.
- Stable performance of PMTs.
- Some updates to software.

Outlook:

- PMT efficiency vs simulation.