



Estimation of the efficiency of small CSCs in Xenon run

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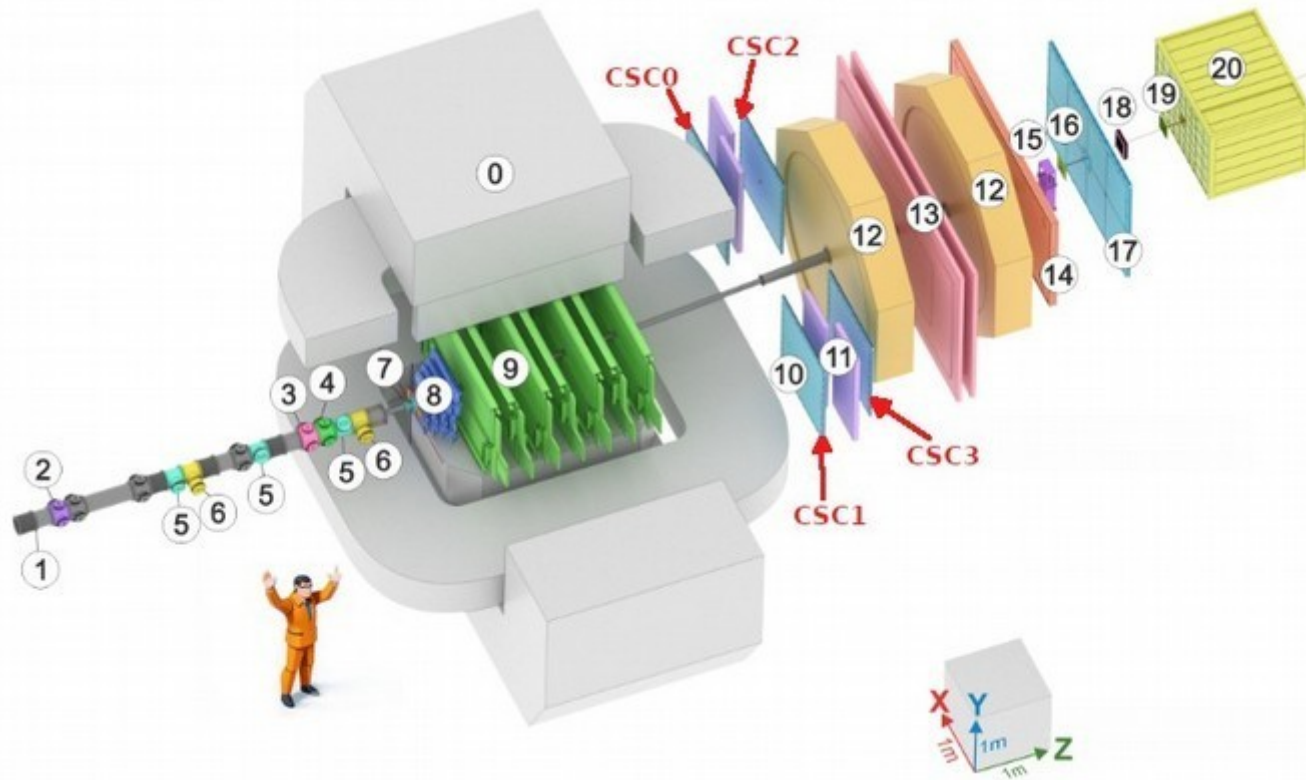
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12th Collaboration Meeting of the BM@N
Experiment at the NICA Facility
14.05.2024, Almaty, Kazakhstan

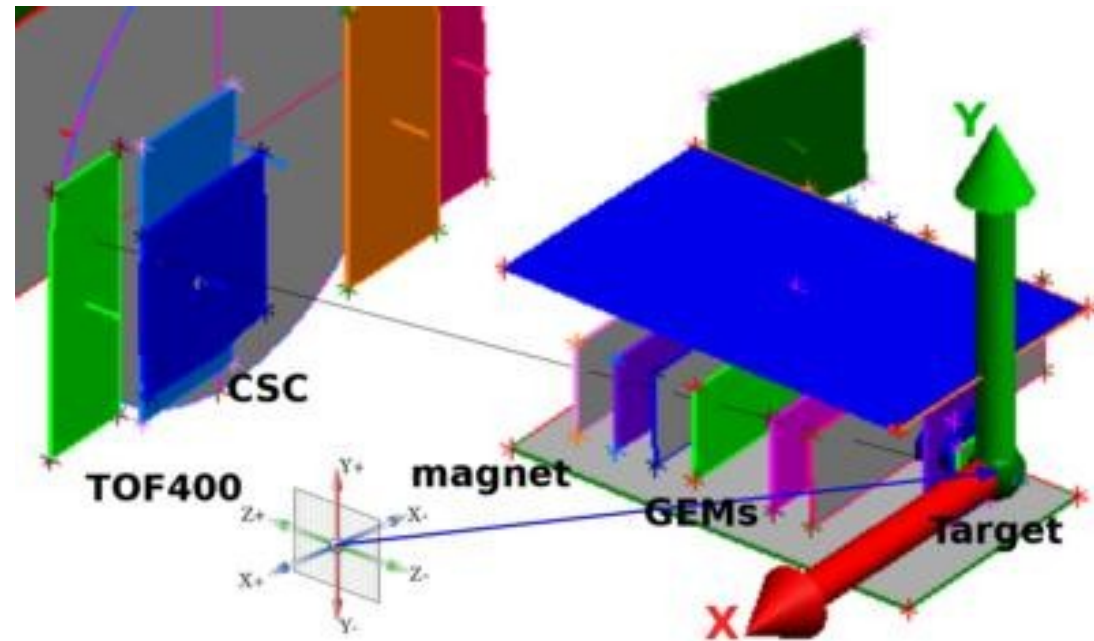
1. Small CSCs numbering
2. Matching and cuts
3. Residuals in CSC and ToF-400
4. Efficiency of small CSCs
5. The dependence of efficiency on run number
6. Resume

Small CSCs numbering



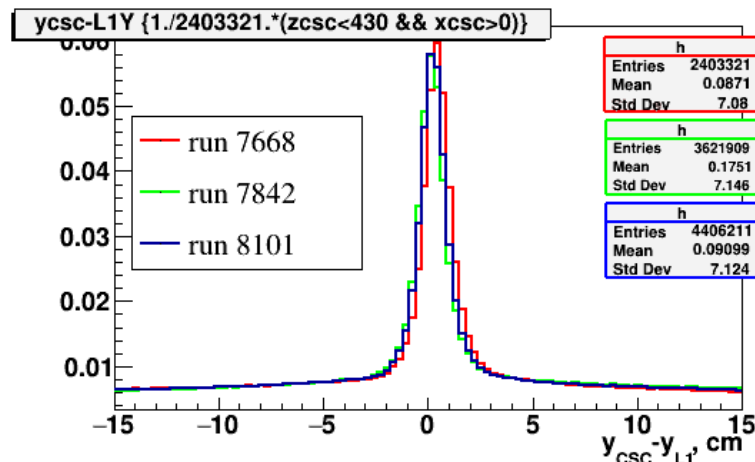
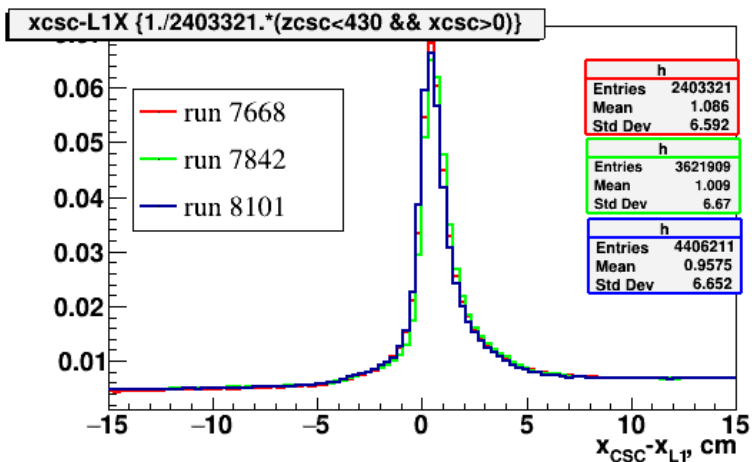
The four small CSCs are indicated by red arrows. Top module – 0, bottom - 1

Matching and cuts

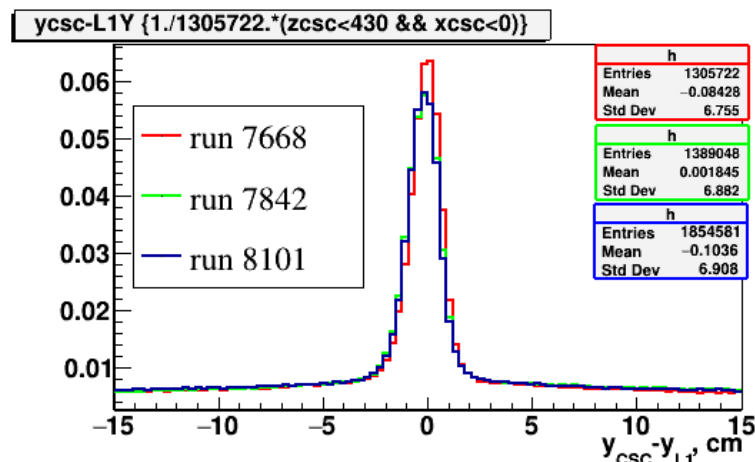
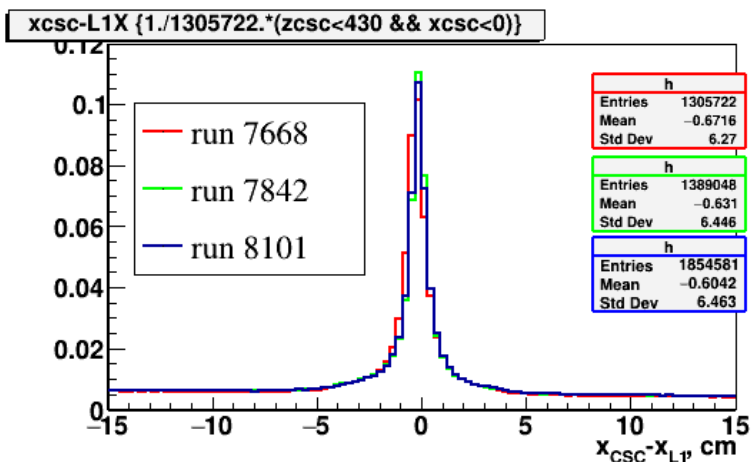


- ✓ $|p| > 1 \text{ GeV}/c$
- ✓ $\text{NGemHits} > 5$
- ✓ $|\Delta_{X(Y)\text{ToF-400Hit-Track}}| < 2 \text{ cm}$
- ✓ $|\Delta_{X(Y)\text{CSCHit-Track}}| < 6 \text{ cm}$ (all CSC hits)
- ✓ $|\text{DCA}_{X(Y)\text{PV}}| < 3 \text{ cm}$
- ✓ If numerator=1, coordinates from CSC hit

CSC residuals

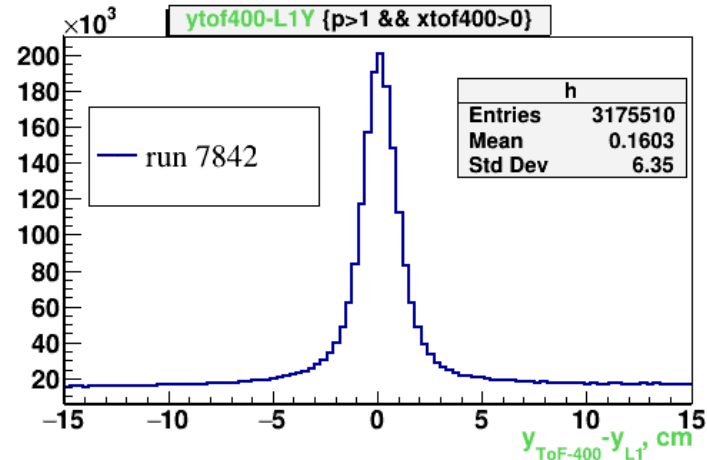
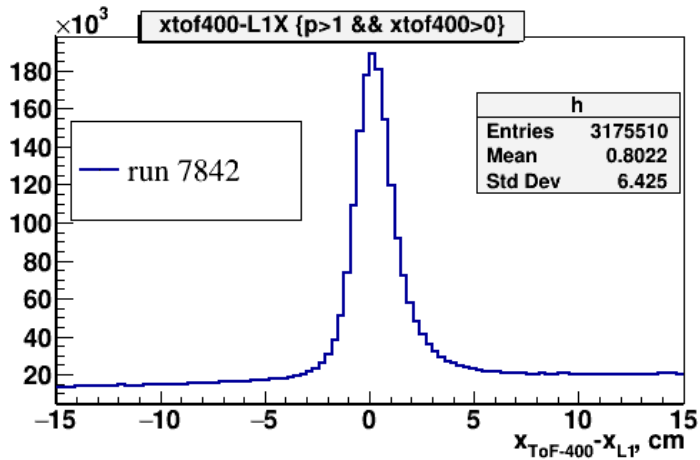


CSC0

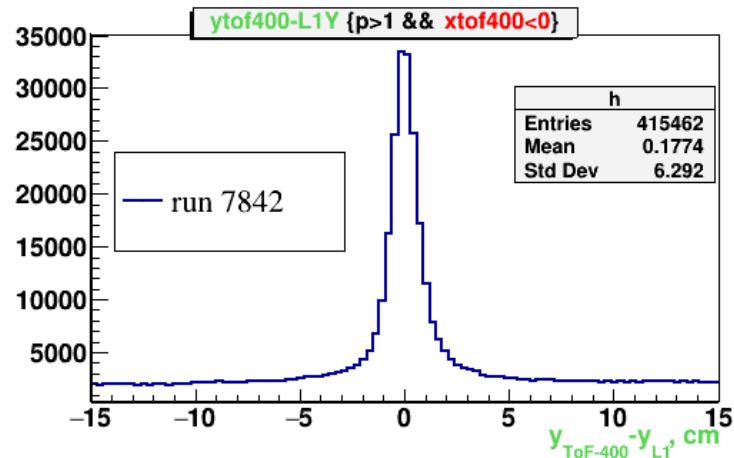
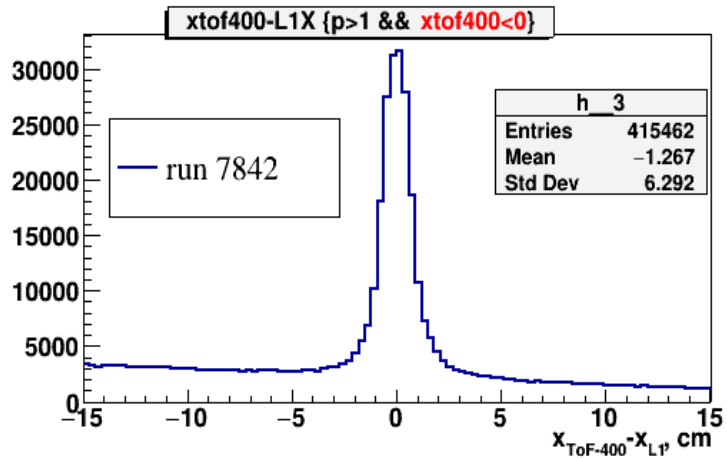


CSC1

ToF-400 residuals



$x > 0$

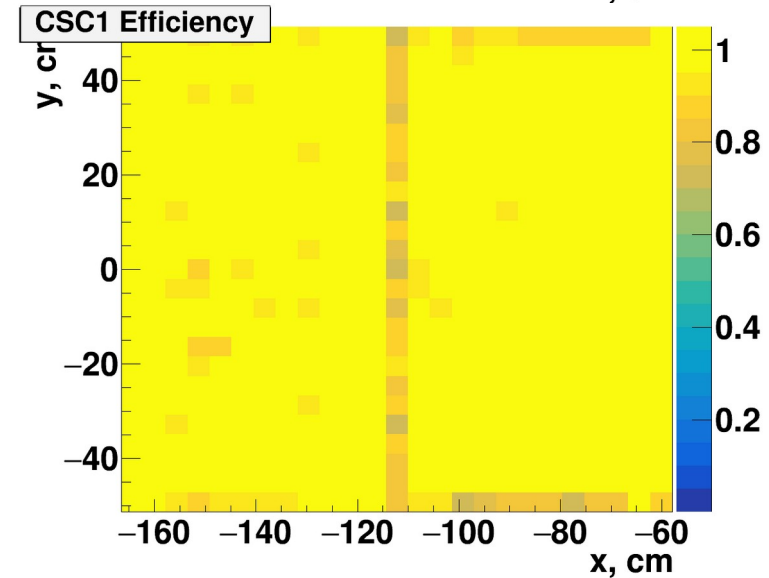
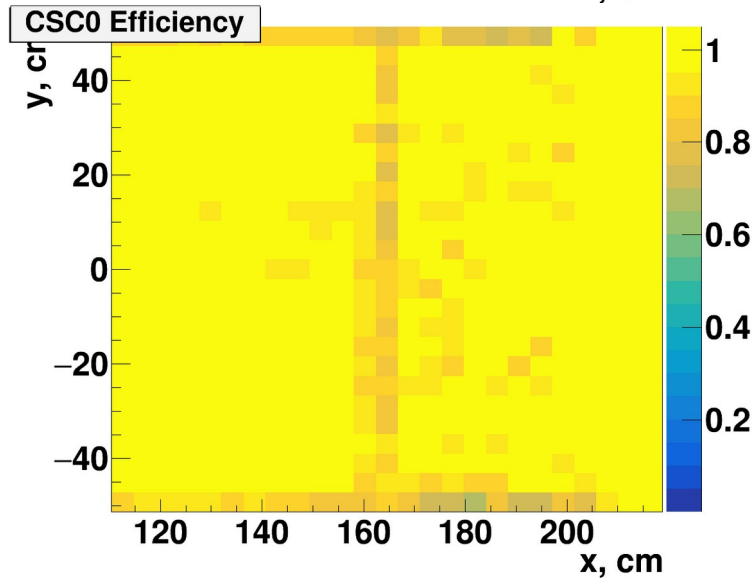
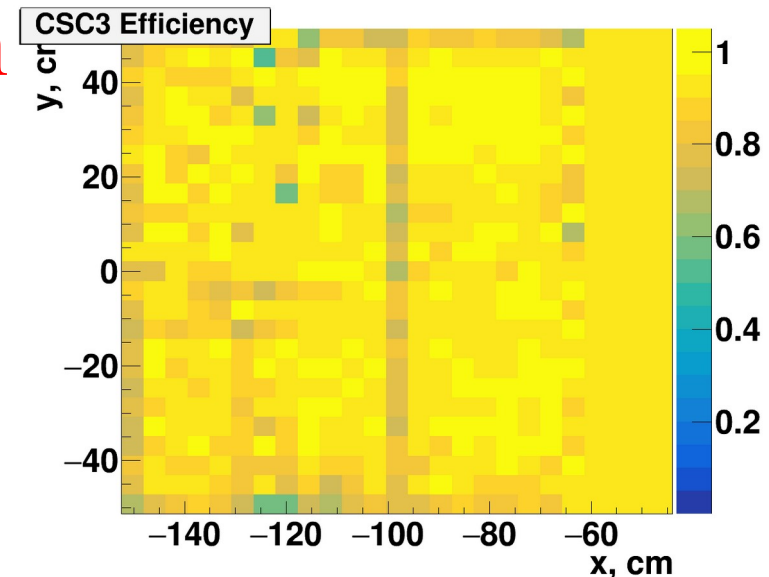
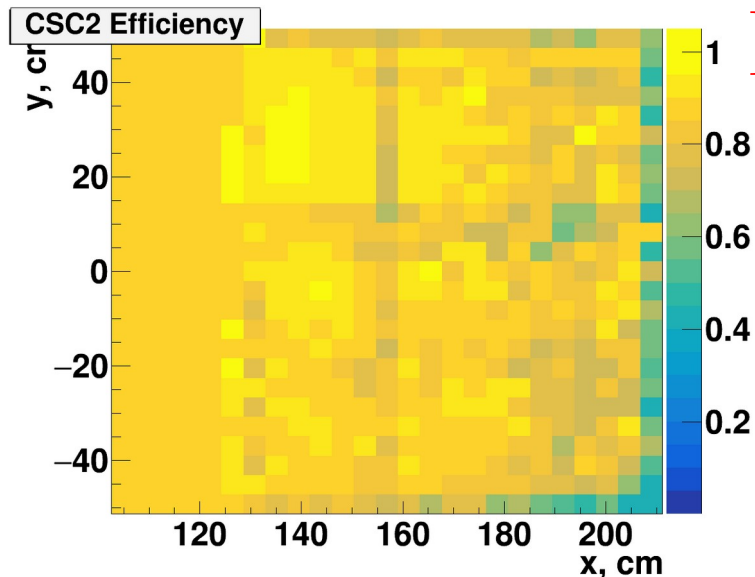


$x < 0$

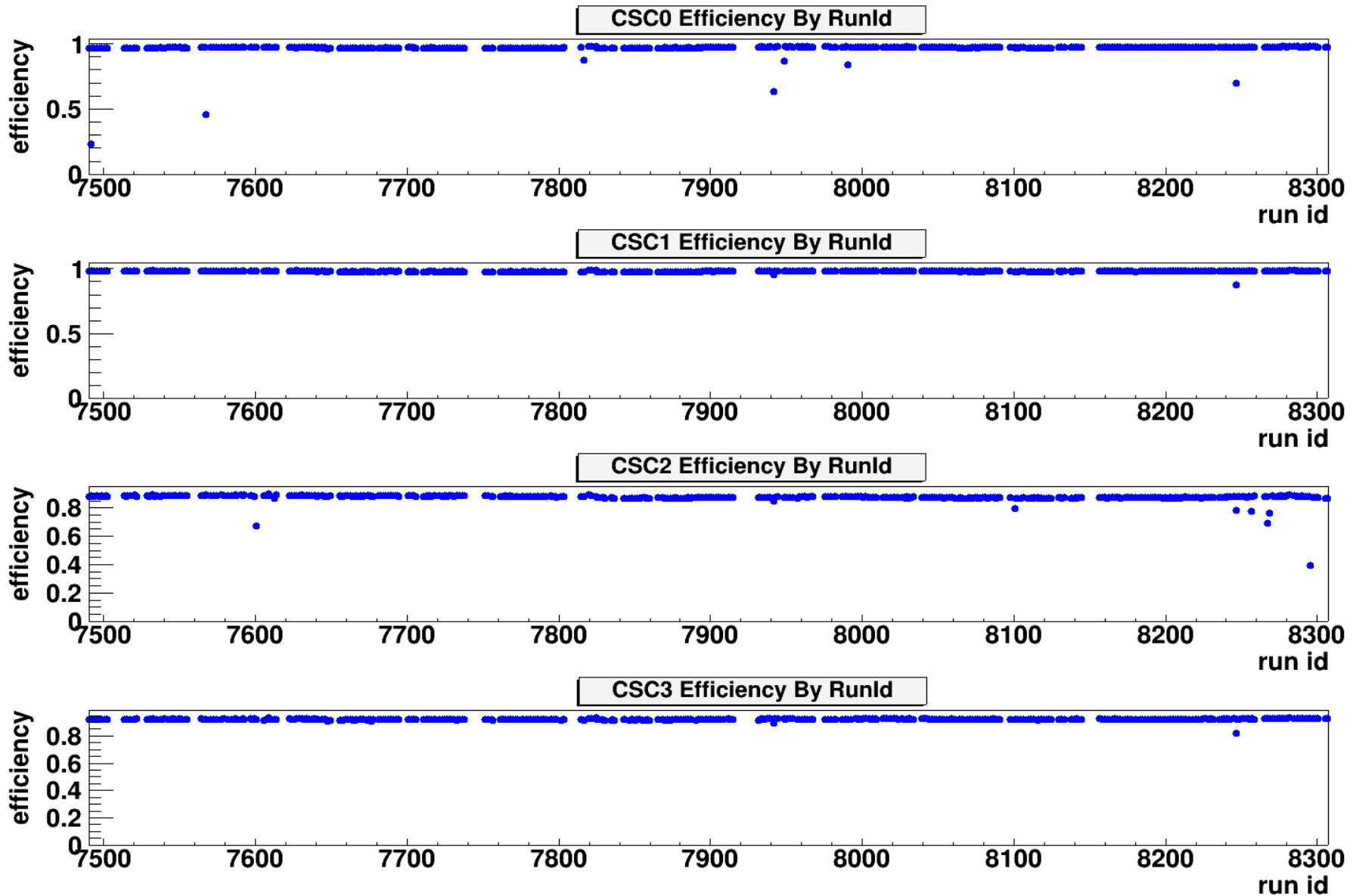
Efficiency (run 7842)



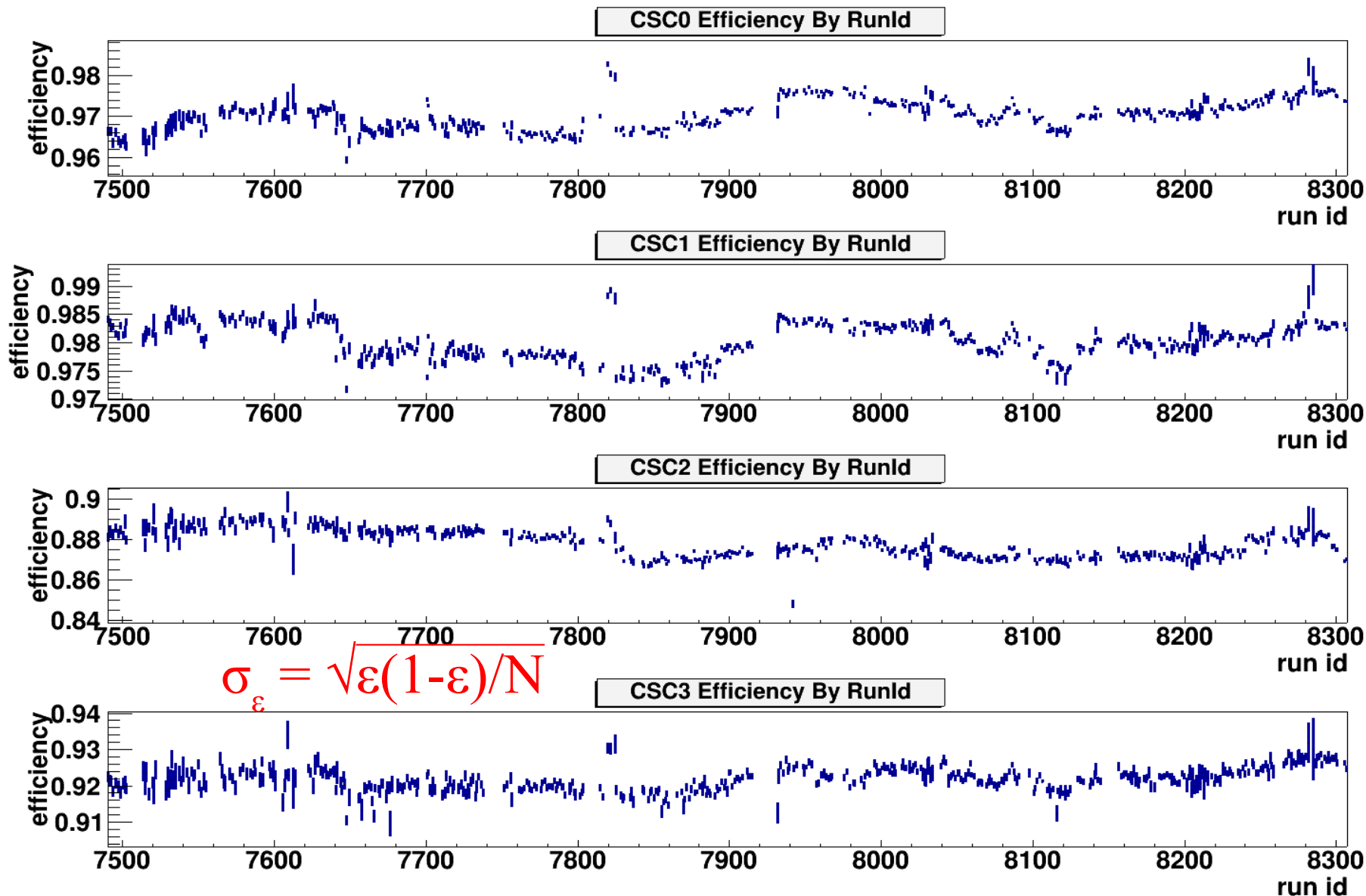
Beam



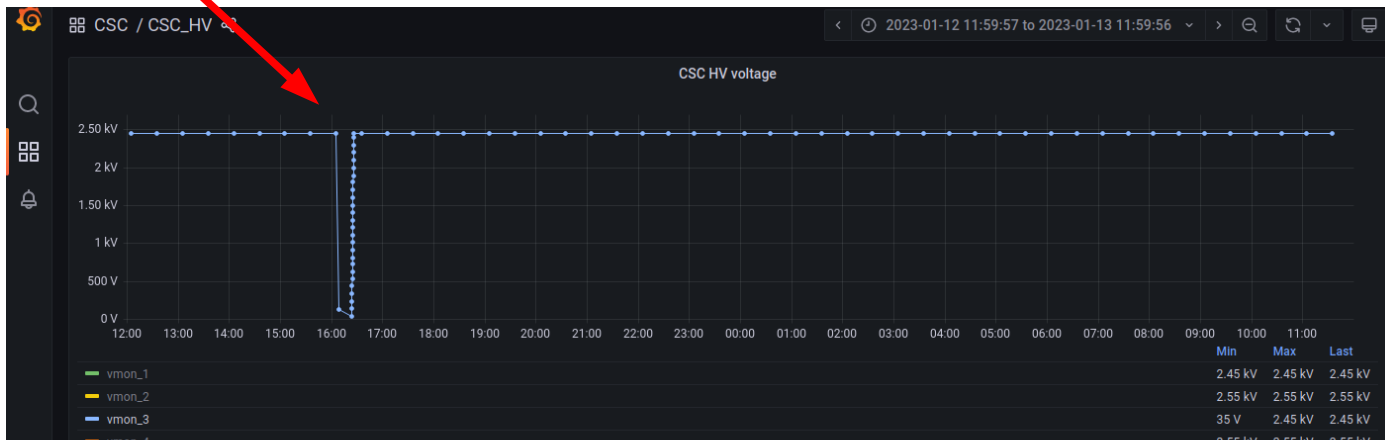
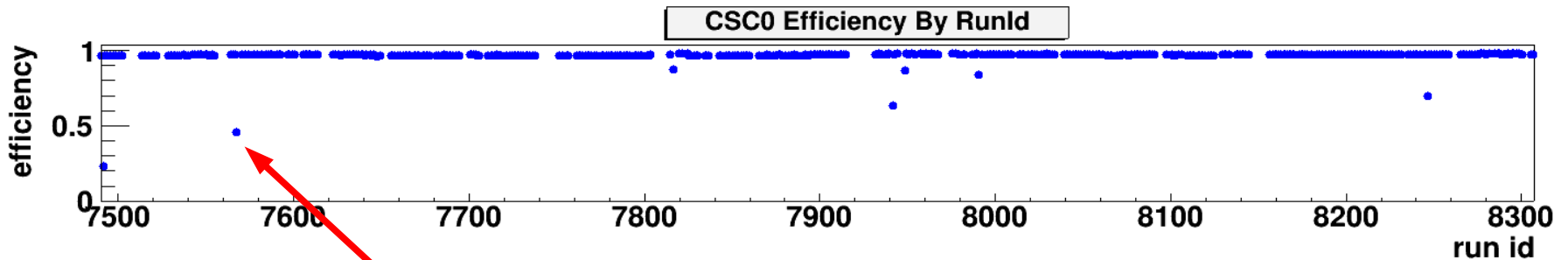
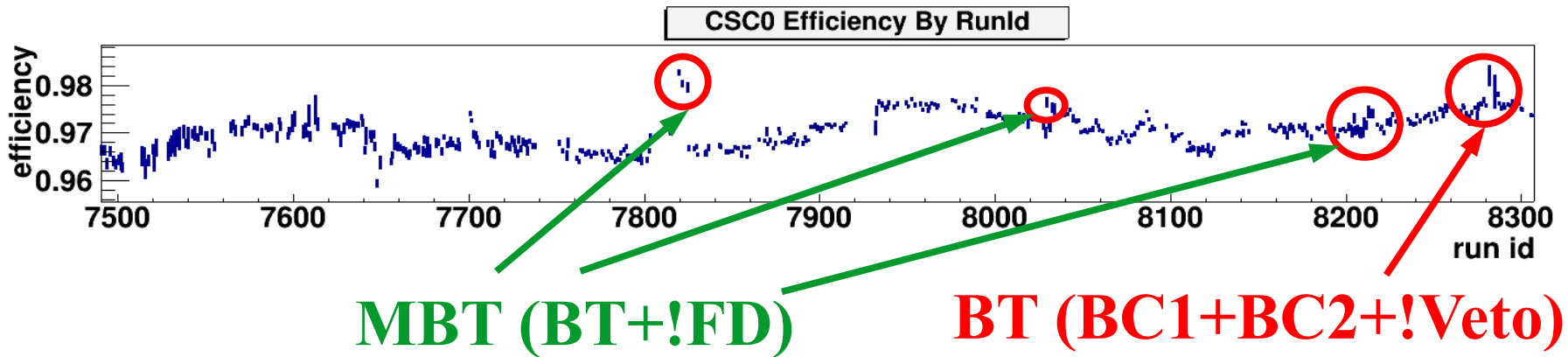
Efficiency vs Run Id



Efficiency vs Run Id



Efficiency vs Run Id (CSC0)



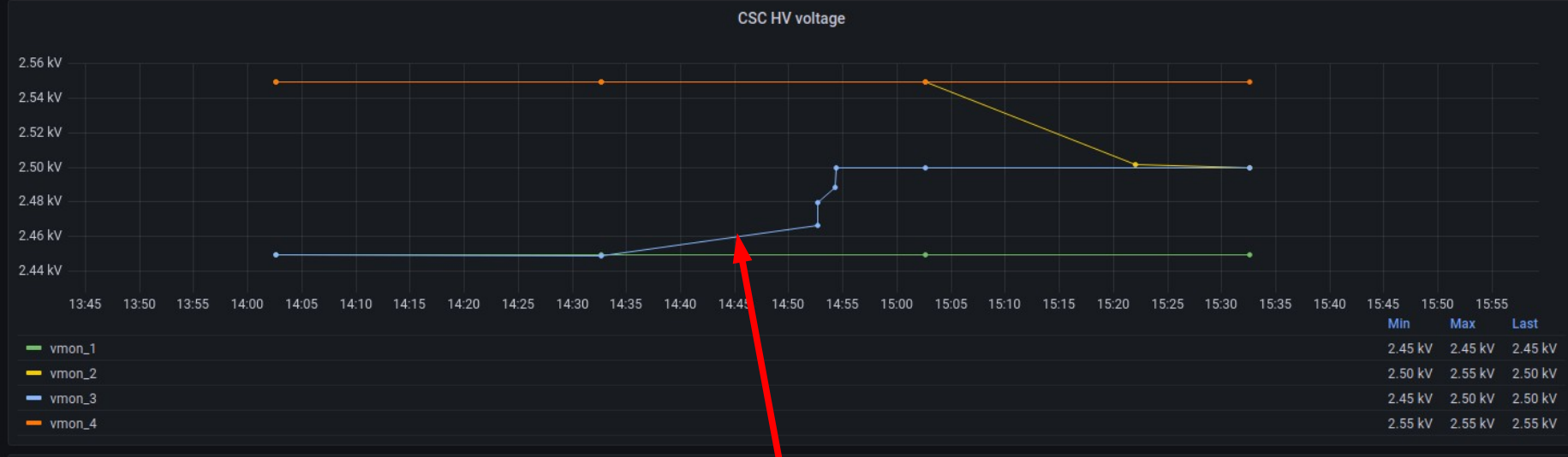
Efficiency vs Run Id (CSC0)



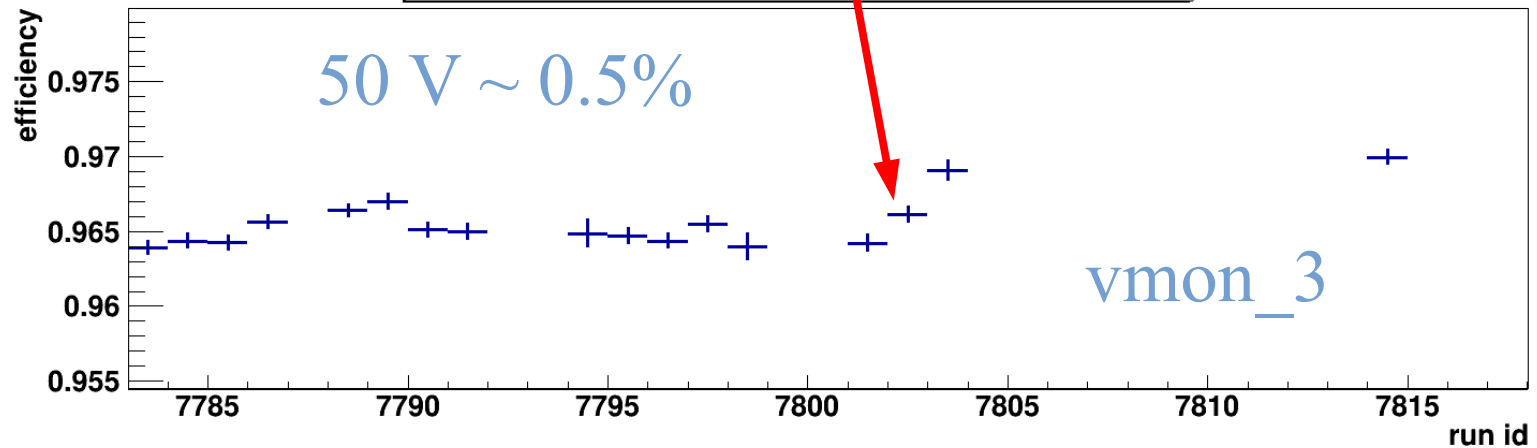
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CSC / CSC_HV

2023-01-18 13:43:47 to 2023-01-18 15:59:20



CSC0 Efficiency By RunId, increase U_{CSC0} from 2.45 to 2.50 kV



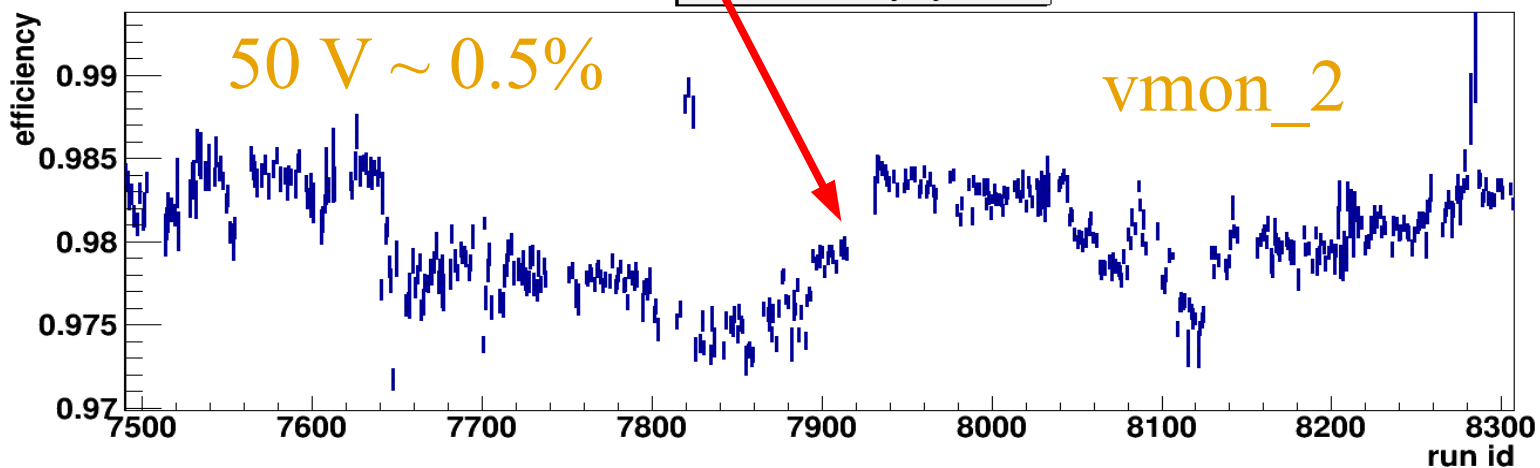
Efficiency vs Run Id (CSC1)



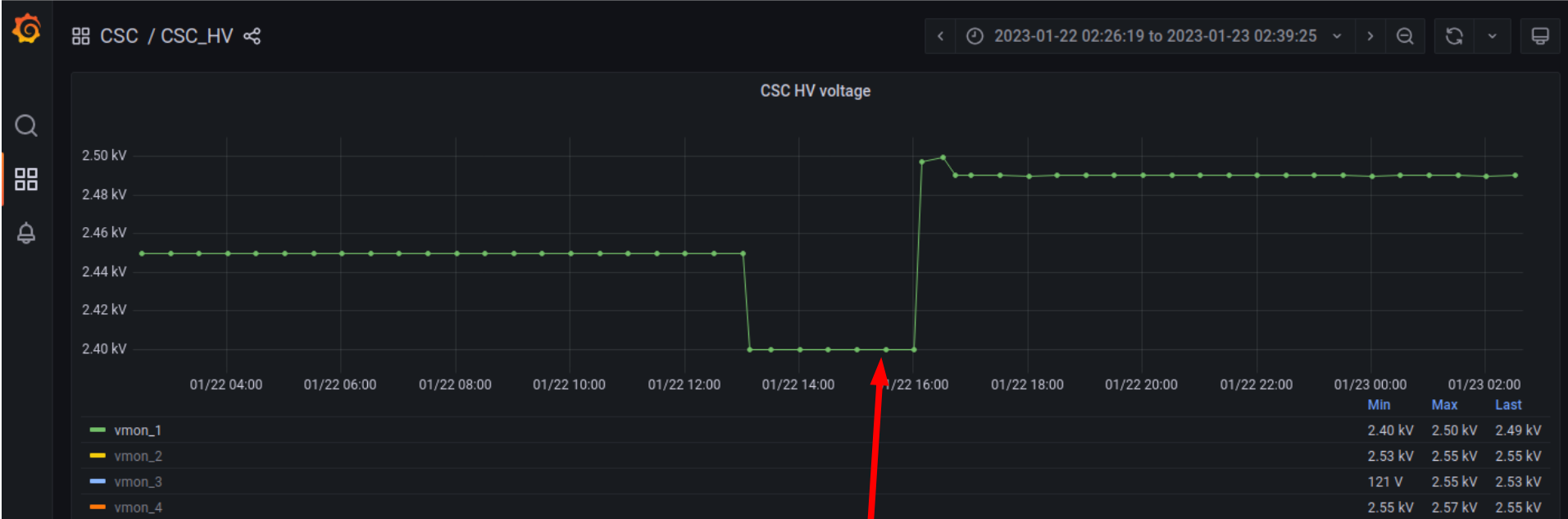
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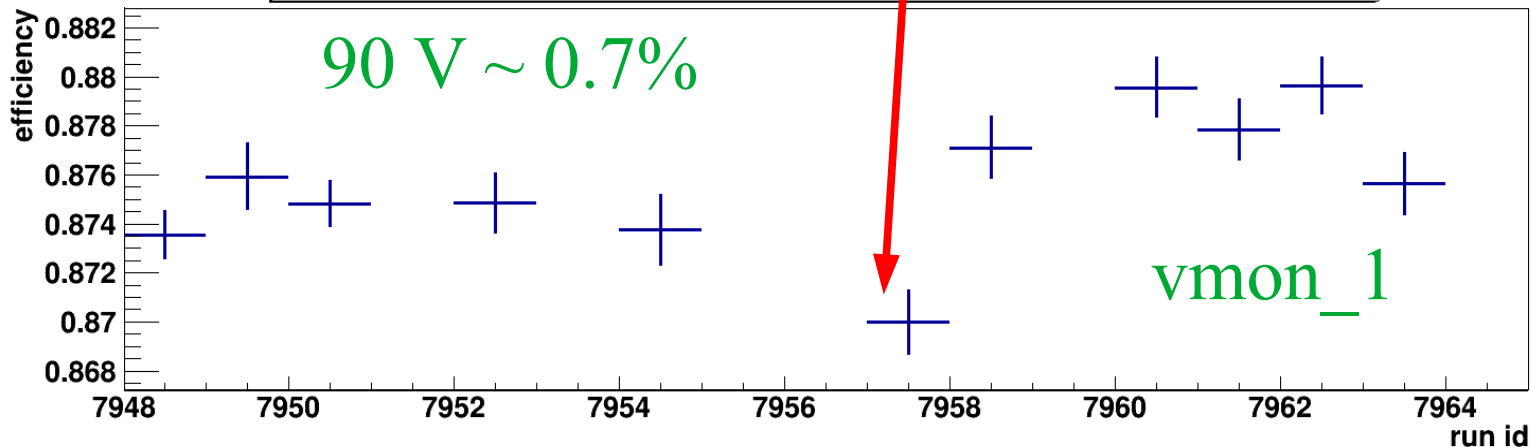
CSC1 Efficiency By Runid



Efficiency vs Run Id (CSC2)



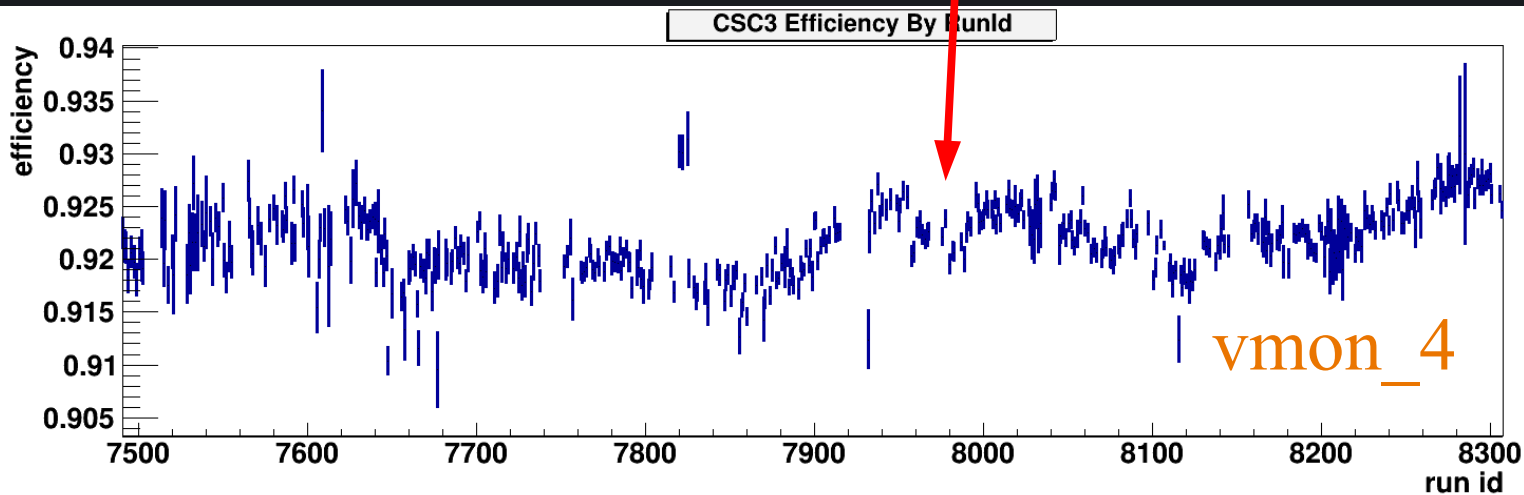
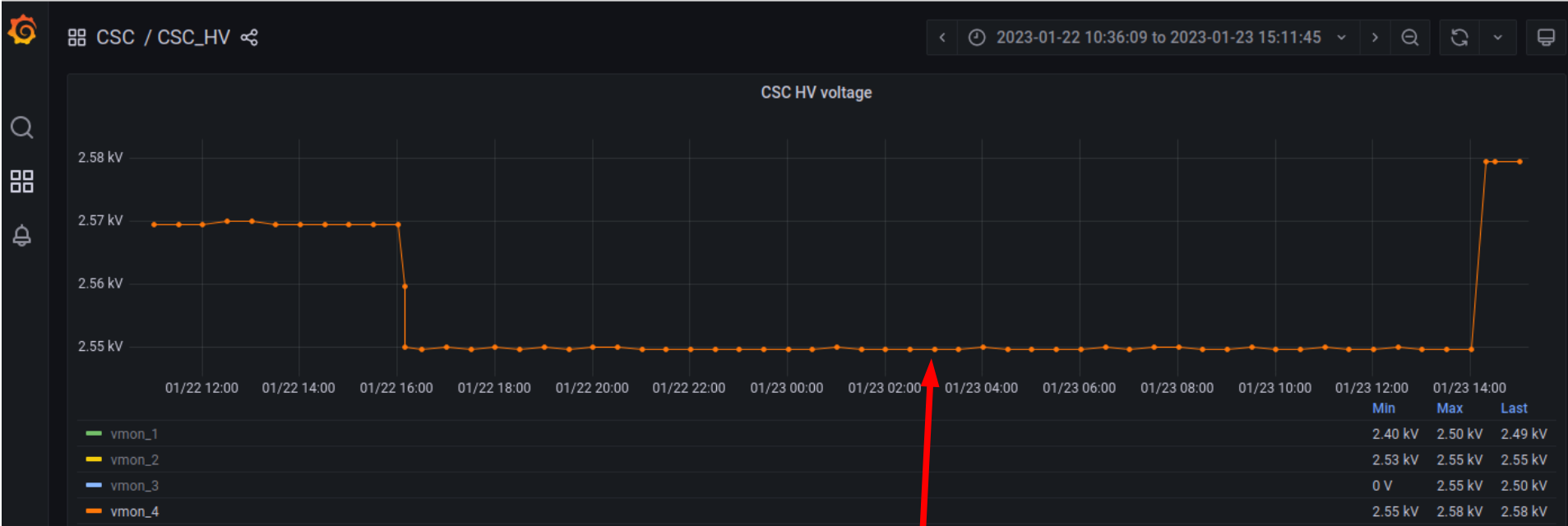
CSC2 Efficiency By RunId, $U_{CSC2(vmon1)} = 2.45, 2.40, 2.49 \text{ kV}$, runs 7954, 7957, 7958. 90 kV ~ 0.7% eff



Efficiency vs Run Id (CSC3)



← → ↻ bmn-sc.jinr.ru/d/dVSU-3J7k/csc_hv?from=1674372969153&to=1674475905110&orgId=1 ☆



1. Residuals of CSC1 and CSC3 hint at proper energy loss and magnetic field map
2. High efficiency of sCSCs
3. High stability of CSC efficiency during Xe run
4. $\Delta U_{\text{HV}} \approx 50 \text{ V} \Rightarrow \Delta \varepsilon \approx 0.5\%$

Thank you for attention!

Backup



Run	N_0	CSC0, $\varepsilon, \%$	CSC1, $\varepsilon, \%$	CSC2, $\varepsilon, \%$	CSC3, $\varepsilon, \%$
7498		96.33 ± 0.12	98.29 ± 0.06	88.48 ± 0.23	91.80 ± 0.16
7842		96.72 ± 0.06	97.35 ± 0.05	86.85 ± 0.12	91.90 ± 0.10
8305		97.37 ± 0.04	98.32 ± 0.04	86.91 ± 0.11	92.62 ± 0.09

$$\sigma_\varepsilon = \sqrt{\varepsilon(1-\varepsilon)/N}$$

