

Svt Data Quality Constraints

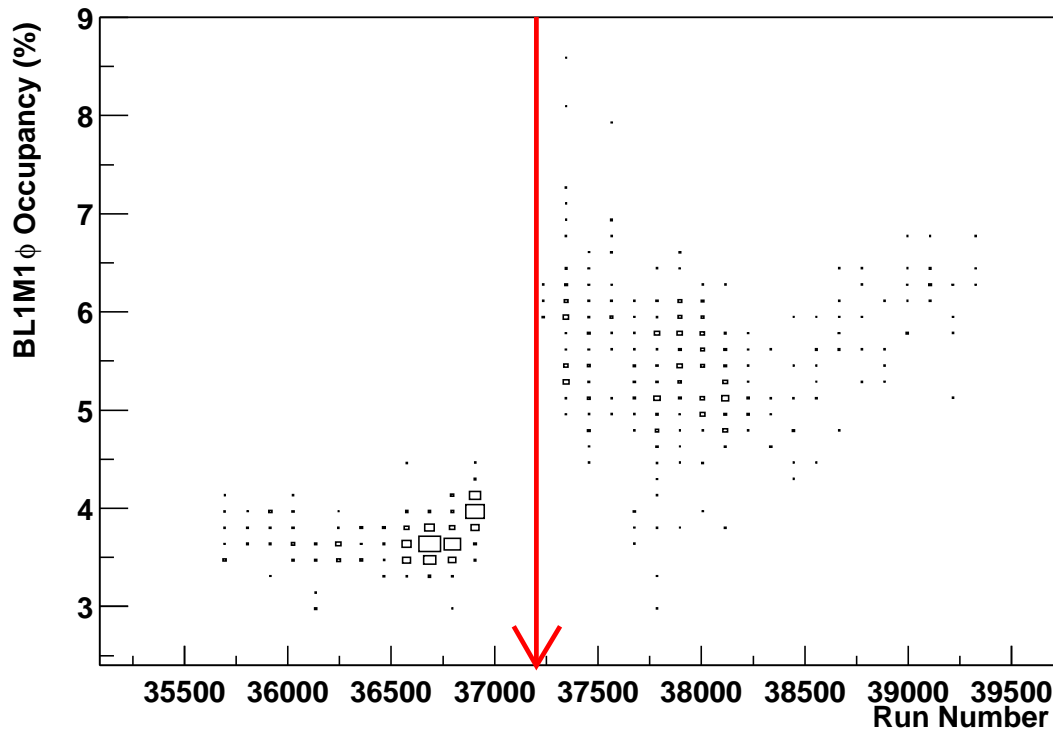
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For the Silicon Vertex Tracker Group

BaBar-PepII Background Workshop
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Svt is Sensitive to PEP Conditions



19 April
Vacuum leak

How can this affect physics?

- Fake hits
- Shadowing

Physics goals of the SVT:

- vertexing
- standalone tracking at low p_t

Method Overview

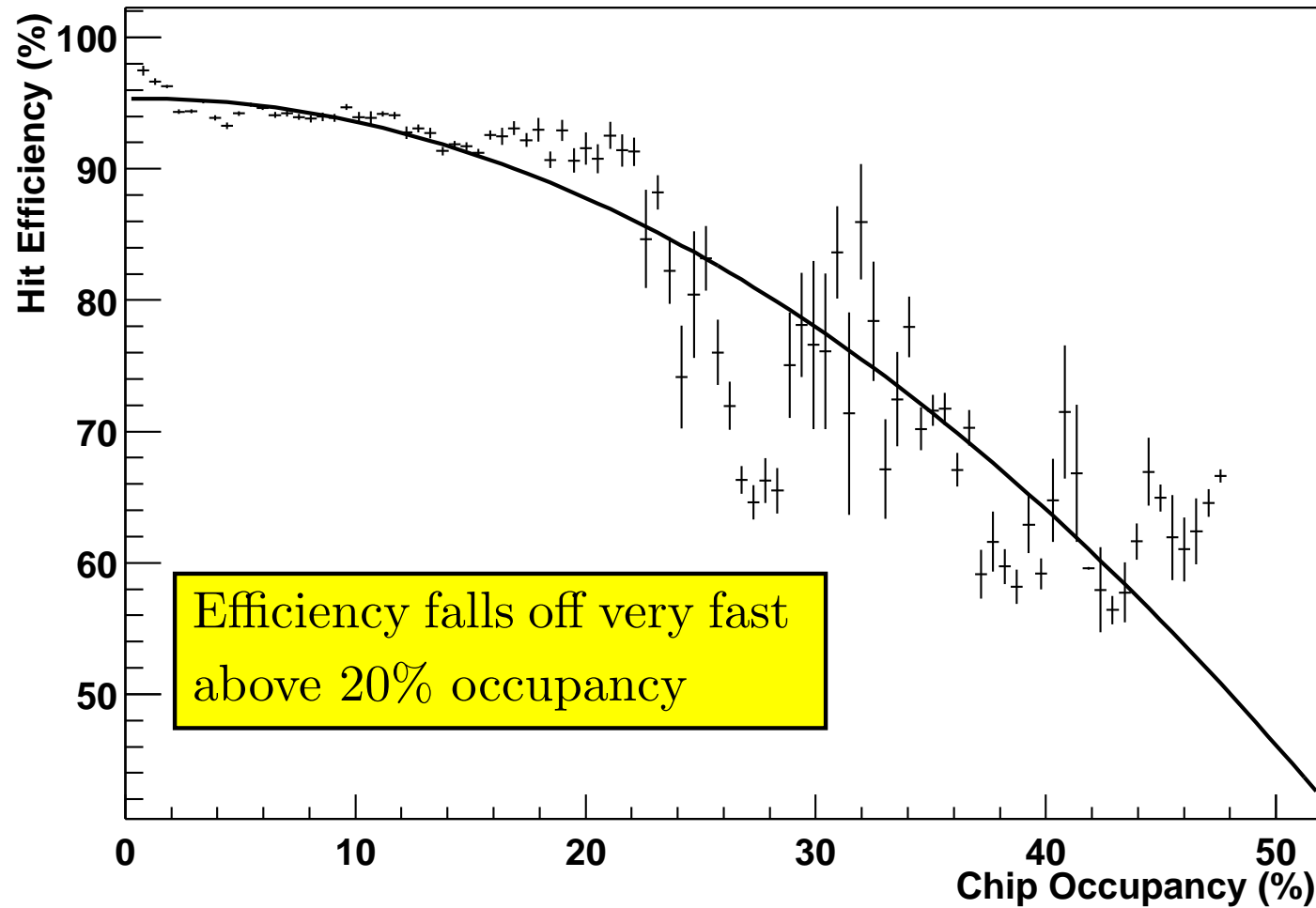
- Monte Carlo studies
 - Useful in understanding possible failure modes
 - Can't believe MC predictions without validation
- Online data quality monitoring
 - Easy access to occupancy-like quantities — number of clusters, cluster length, event size
 - Can identify major problems but no direct connection to *quality* of data
- Offline data quality monitoring
 - Study physics-like analysis quantities
 - Can correlate data quality with online variables

Methodology (II)

Look at data from January—June 2003

- Covers wide range of detector conditions
- Evaluate performance of SVT during this time, and extrapolate to set operational limits
- Study hit efficiency and resolution, D^* efficiency in $\sim 8 \text{ fb}^{-1}$ (800 runs)
- Study vertex resolution in MC

Hit Efficiency



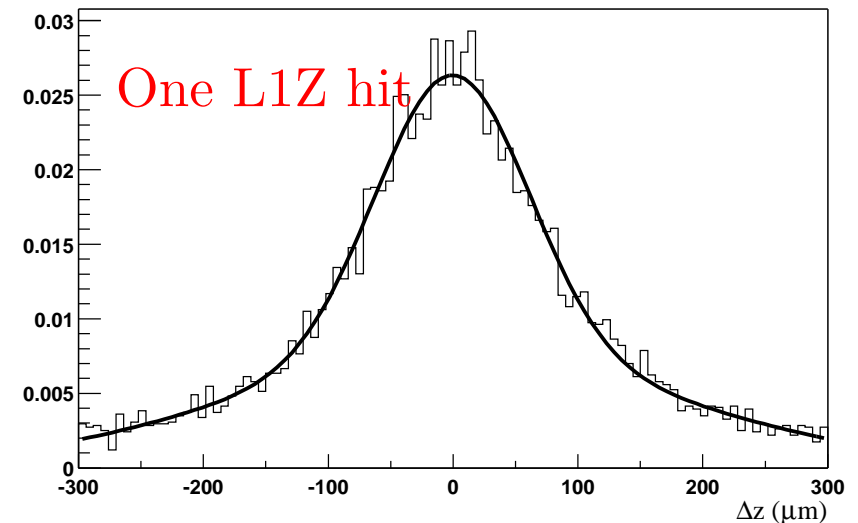
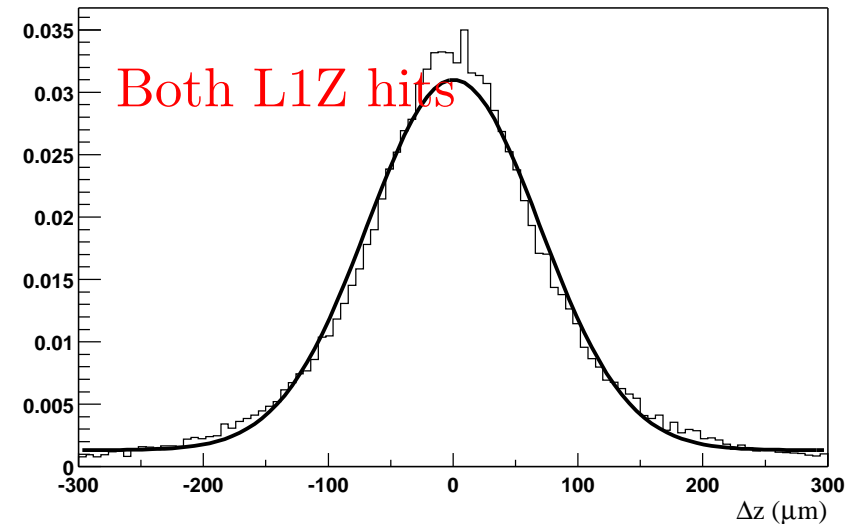
Vertex Resolution with Missing Hits

Study Δz resolution in MC

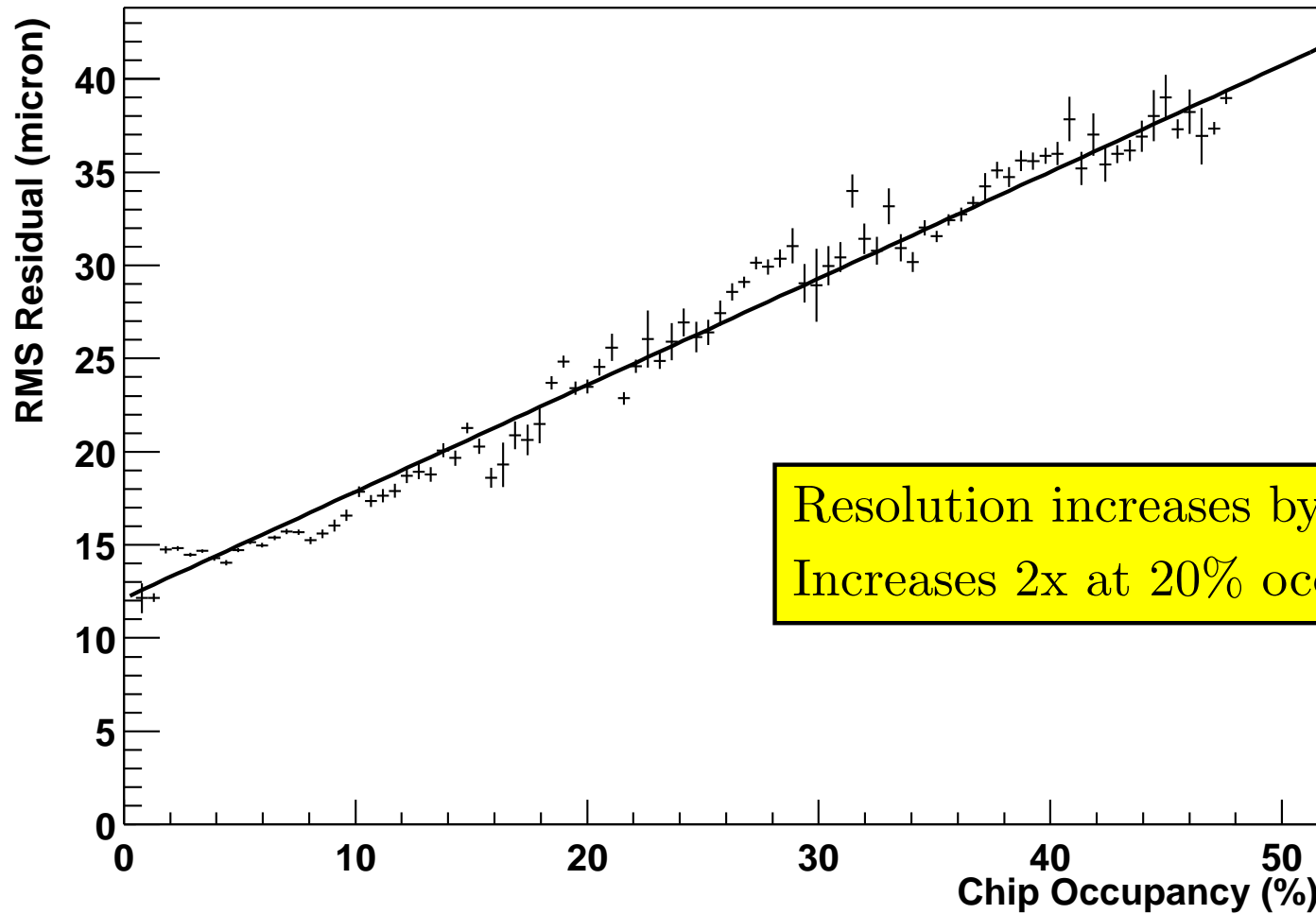
Using $D \rightarrow K\pi$, compare vertices with two L1Z hits to those missing one hit

Δz RMS increases $90 \rightarrow 120\mu$

σ of outlier gaussian increases $100 \rightarrow 180\mu$



Hit Residual Resolution



D^* Reconstruction

$$D^0 \rightarrow K\pi$$

K : KMicroTight

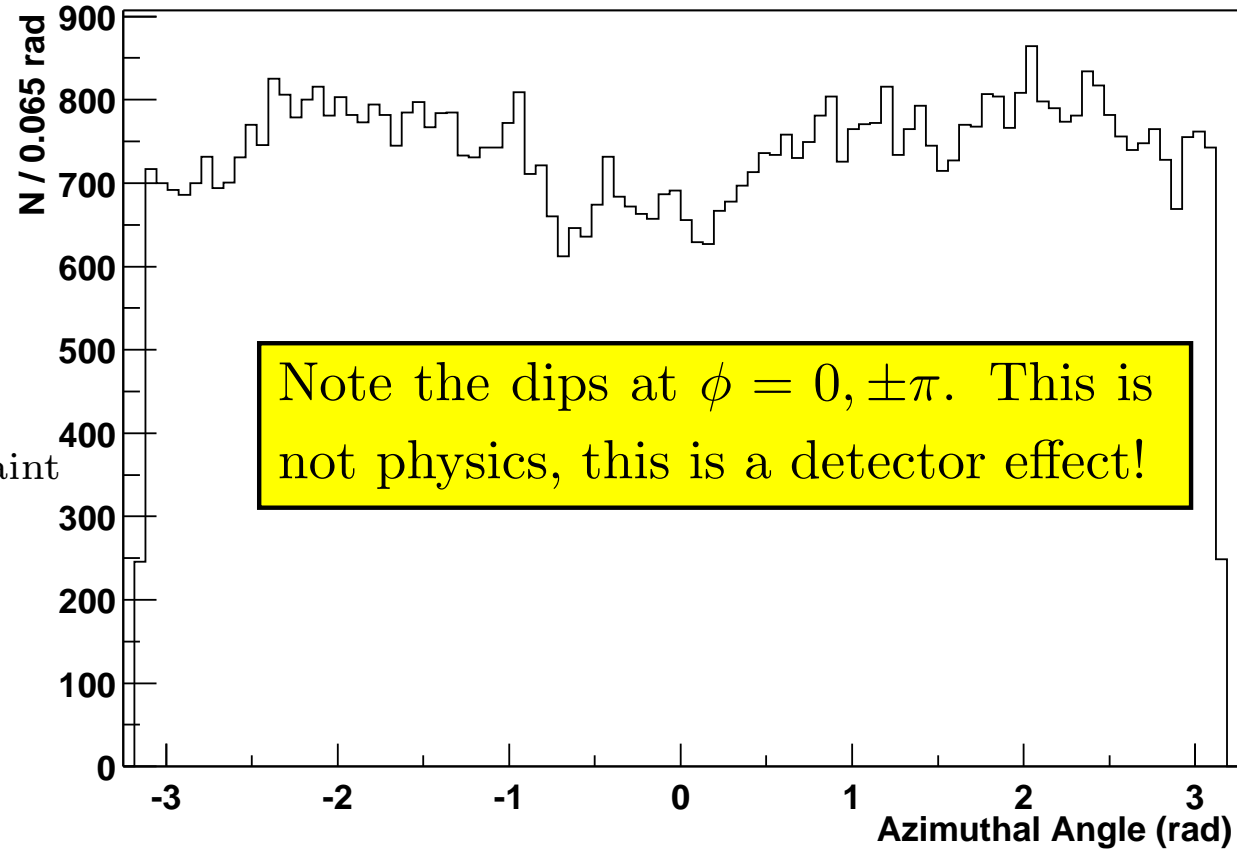
π : GTVL

$$D^* \rightarrow D^0\pi_s$$

π_s : GTVL

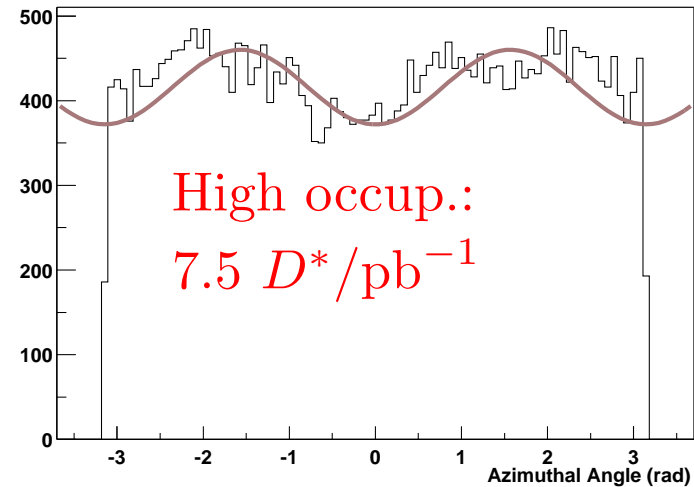
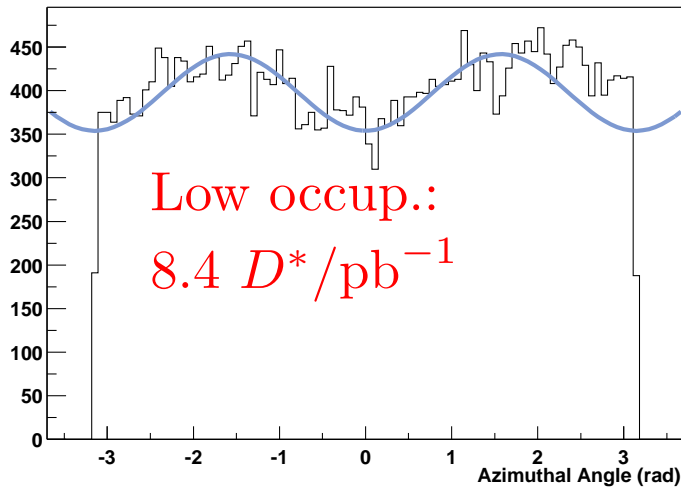
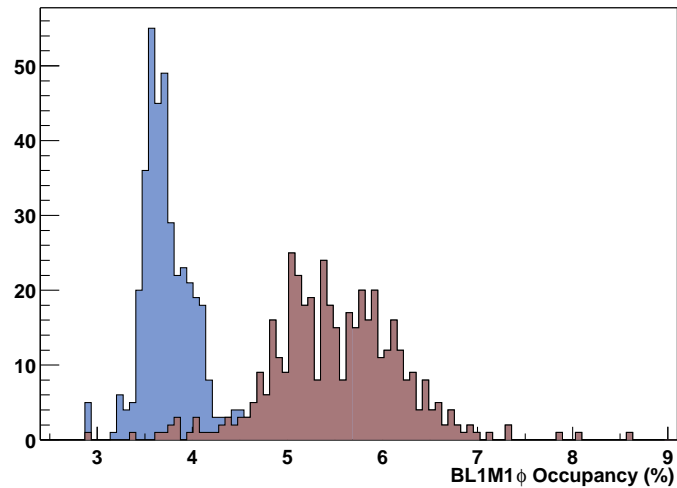
$$p^* < 450 \text{ MeV}$$

Beamspot constraint

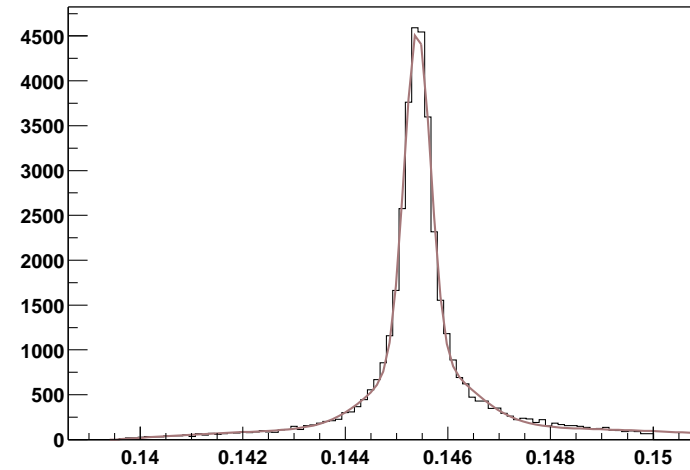
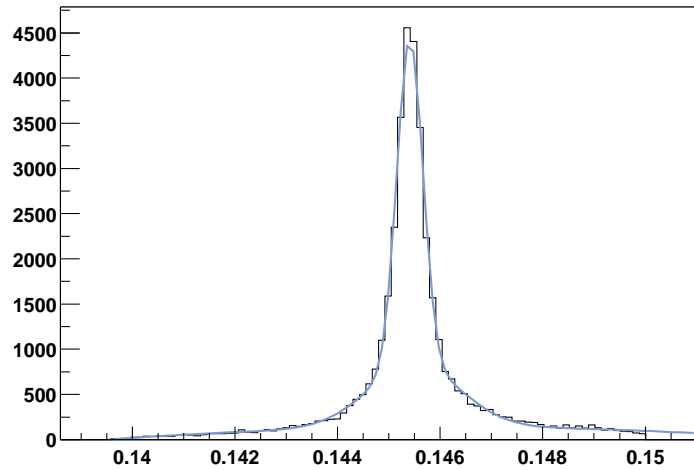


D^* Dependence on Occupancy

Divide sample in two
according to occupancy:



D^* Dependence on Occupancy (II)



- No difference in δm resolution, probably from beamspot constraint
- 10% difference in efficiency

Conclusions

- We have seen a loss in hit efficiency and resolution that depends on accelerator background
- Above single-chip occupancies of 20%, SVT performance is strongly degraded
- This effect is also apparent as a real loss in D^* efficiency
- Stable running should respect some critical \mathcal{L}/BG ratio