

MDC性能和数据检查

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内容

➤MDC 性能常规检查

- ✓ 19年所取全部数据 的MDC 性能常规检查

➤TOP-UP 模式数据分析

- ✓ 四次 Top-up 取数模式下的数据分析

MDC 性能常规检查

➤ Run 56769 – 62823(181118 ~ 190620, round 12)

➤ BOSS 版本：7.0.4

➤ 进行三轮 MDC 检查

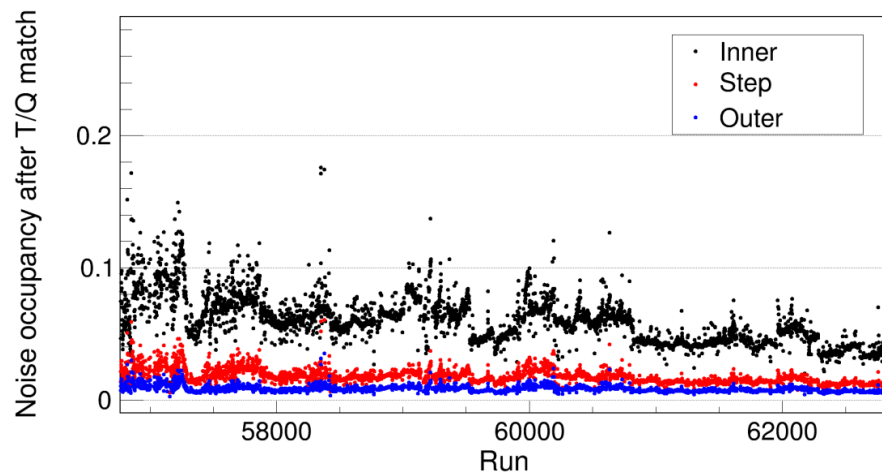
- ✓ 新数据取下先使用老的刻度检查数据质量并及时反馈
- ✓ 测试版本的事例起始时间刻度更新后进行再一轮检查
- ✓ 事例起始时间刻度完成后进行最后一轮检查

➤ 利用Bhabha事例对 MDC 性能进行检查

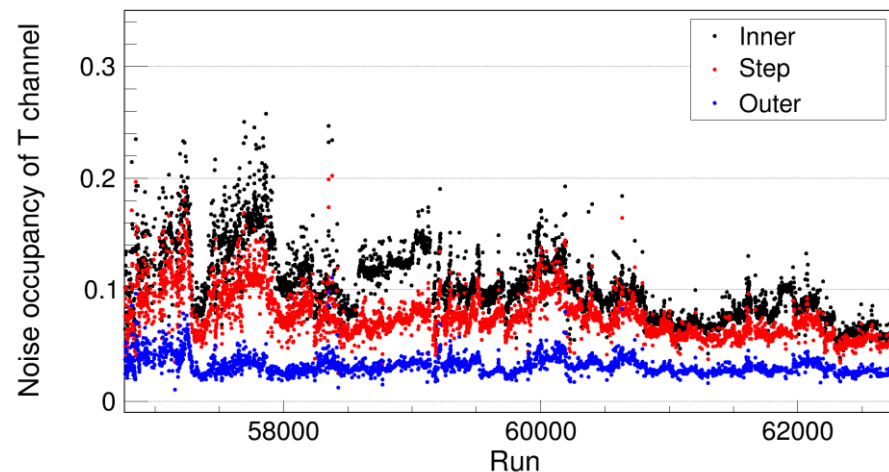
- ✓ 噪声水平（T道，T-Q道）
- ✓ 动量及动量分辨
- ✓ 空间分辨
- ✓ 击中效率
- ✓ Z0分布

MDC性能(run by run)

1. 噪声水平：利用Bhabha事例，减掉预期的信号数（每层两个）
计算其占有率



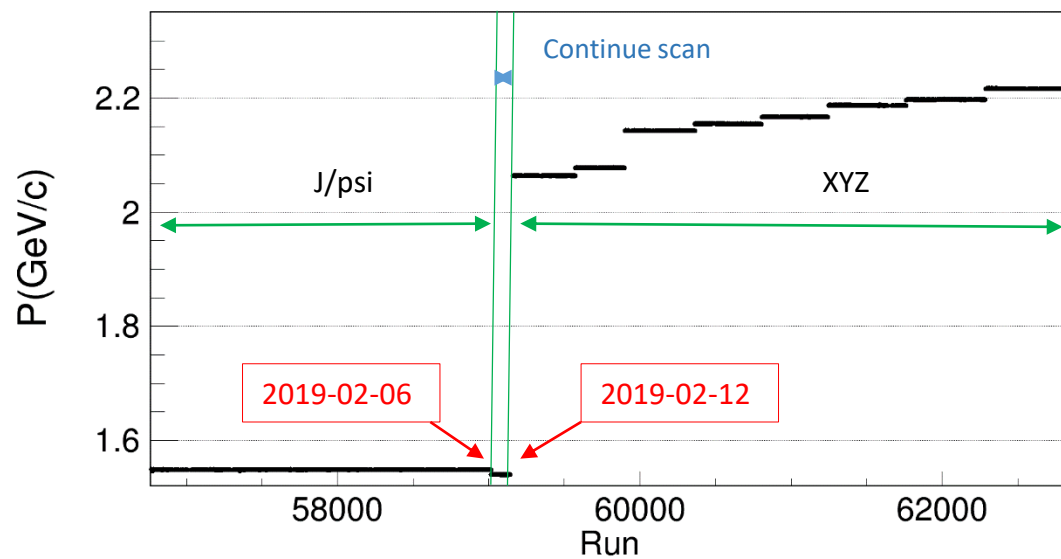
T道和Q道信息都存在



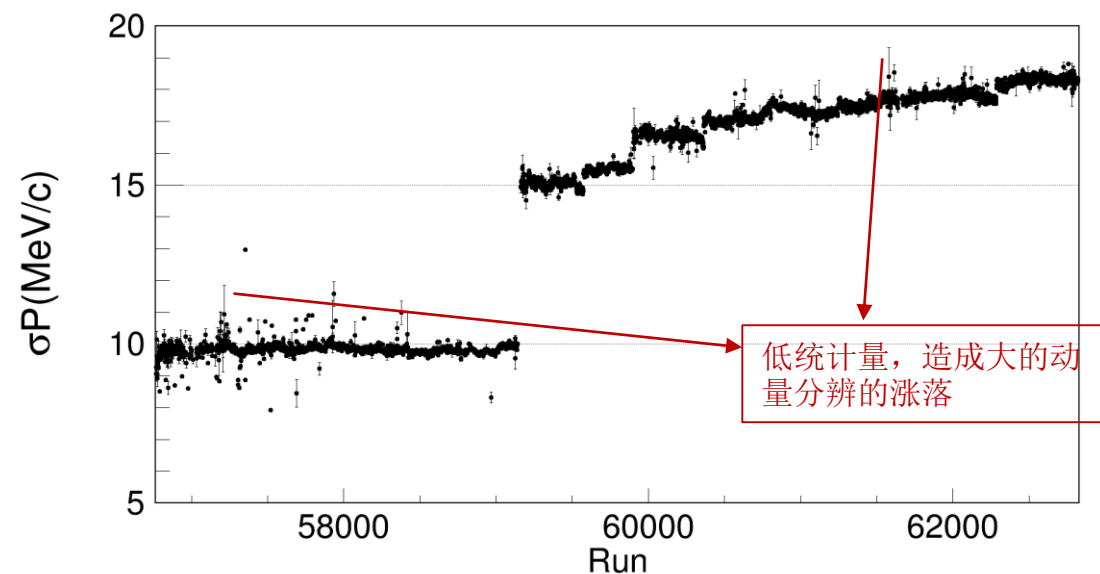
只存在T道信息

MDC性能(run by run)

2. 动量及动量分辨：对每个run的事例的动量分布进行拟合，拿到相应动量的中心值及分辨



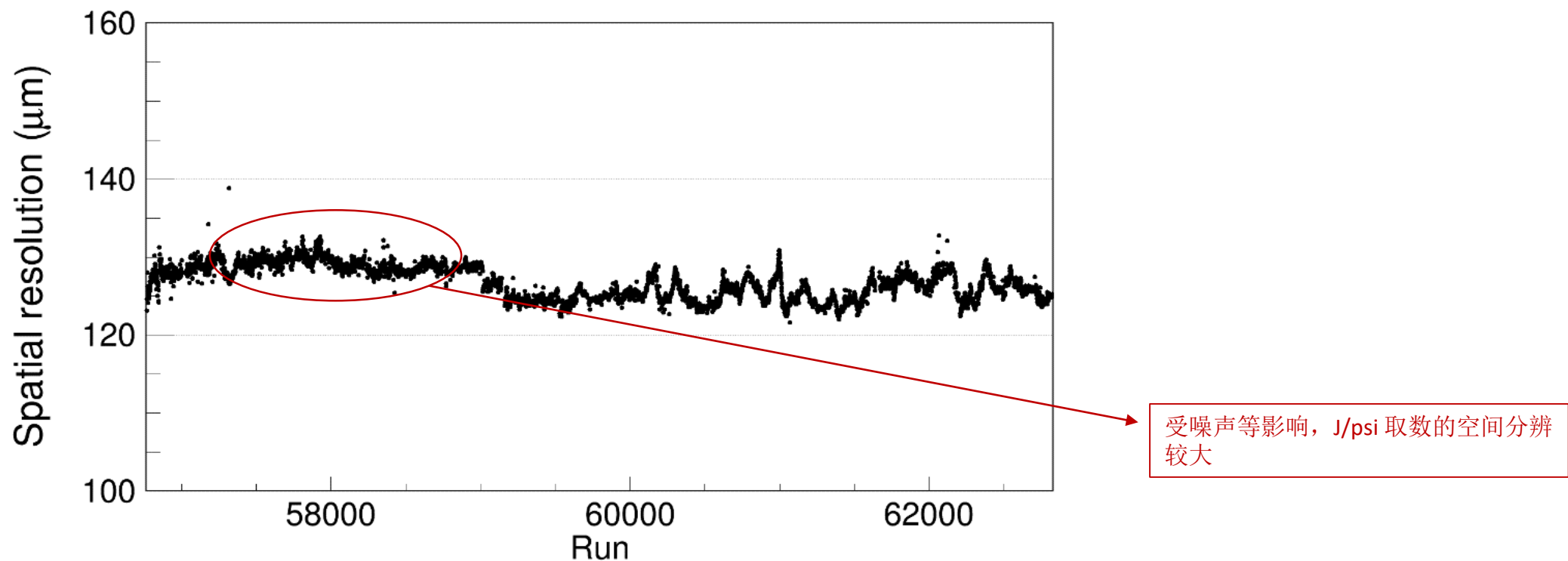
动量



动量分辨

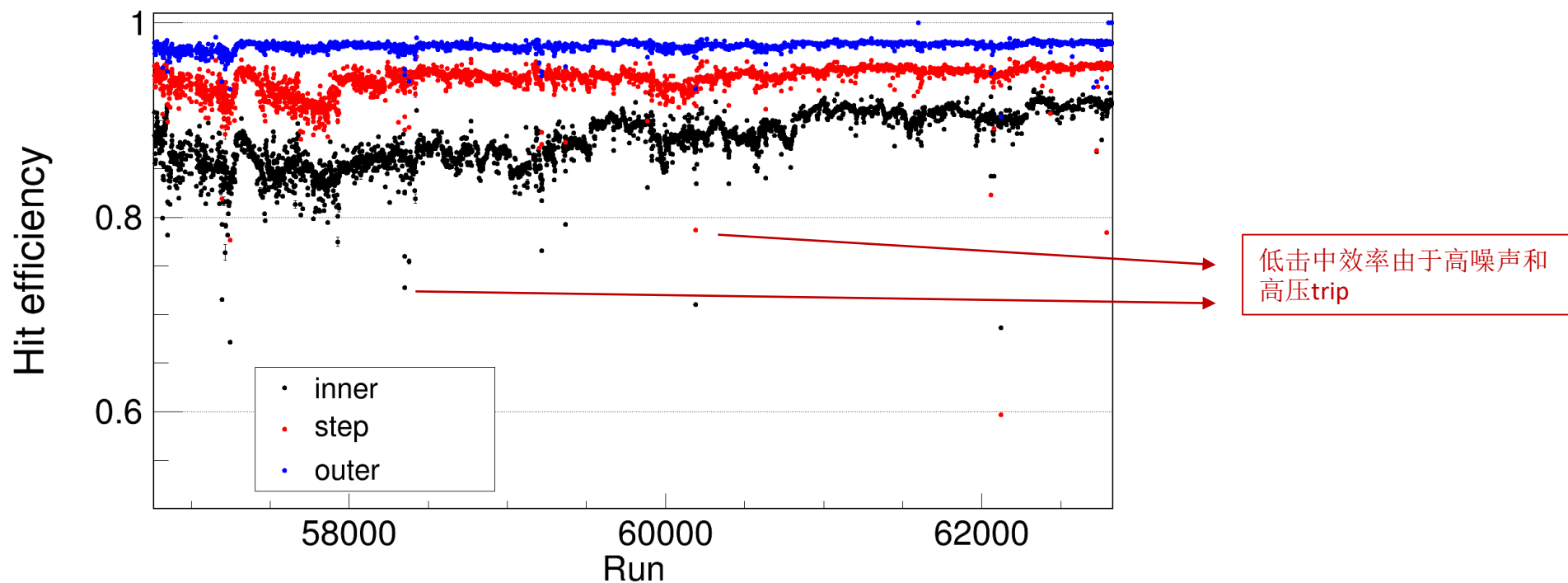
MDC性能(run by run)

3. 空间分辨：用残差分布宽度表示，受到噪声、增益等因素的影响



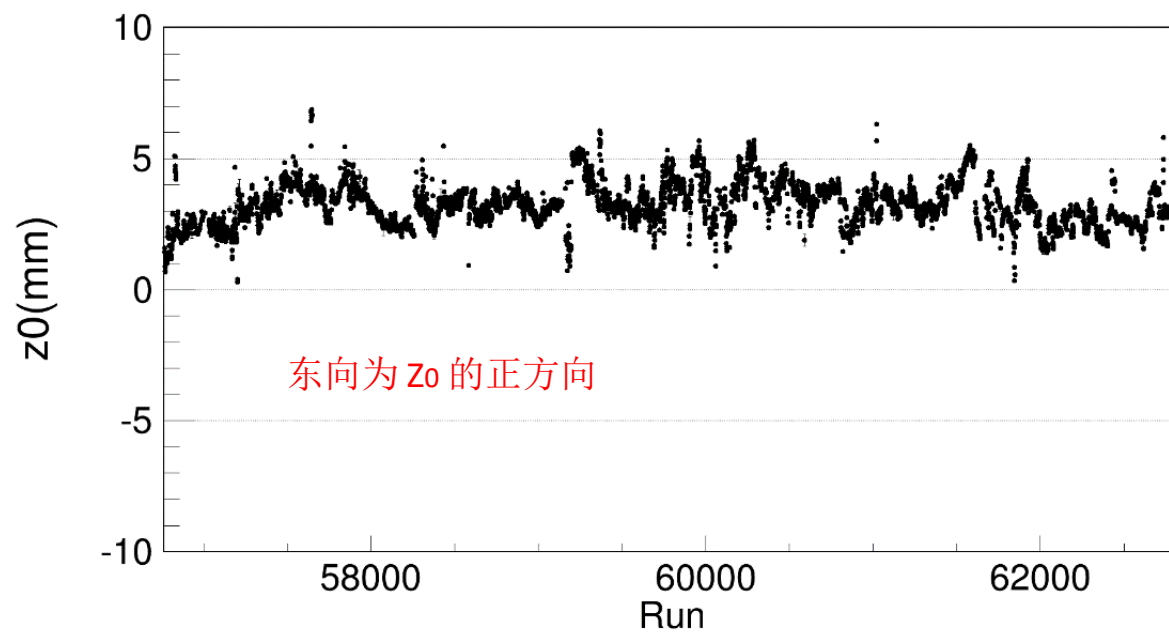
MDC性能(run by run)

4. 击中效率：每个单元的探测效率，即有信号通过时产生信号的概率

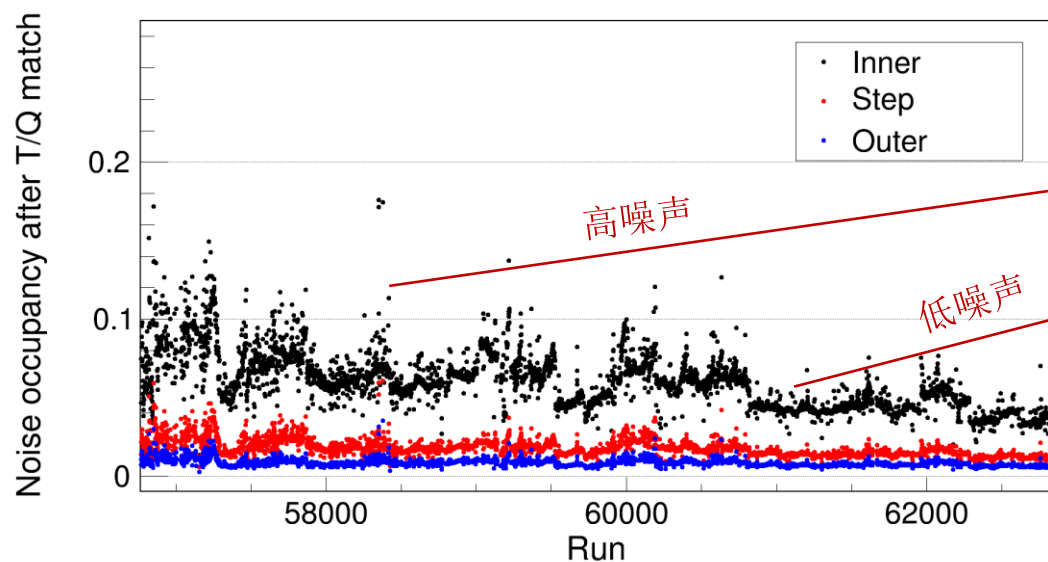


MDC性能(run by run)

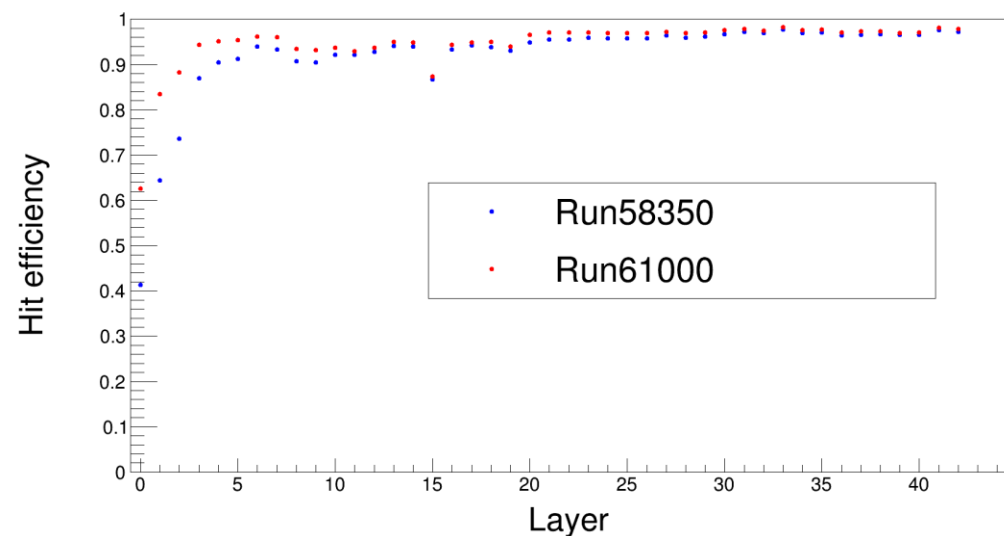
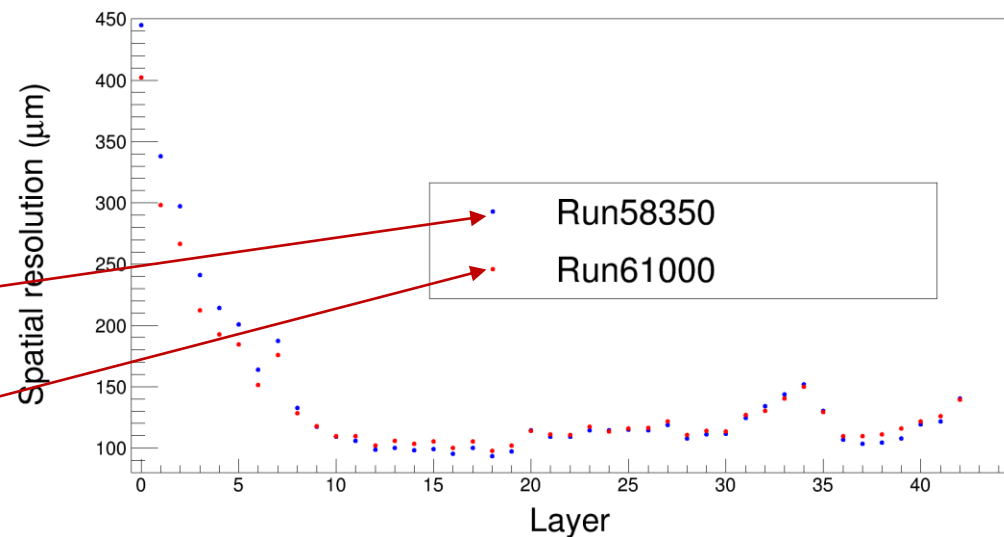
5. z_0 分布：对撞顶点距离坐标原点Z方向的距离



分辨和击中效率受噪声影响



噪声对MDC的空间分辨和效率有影响，对内室(前八层)影响最为明显，噪声越大分辨和击中效率越差



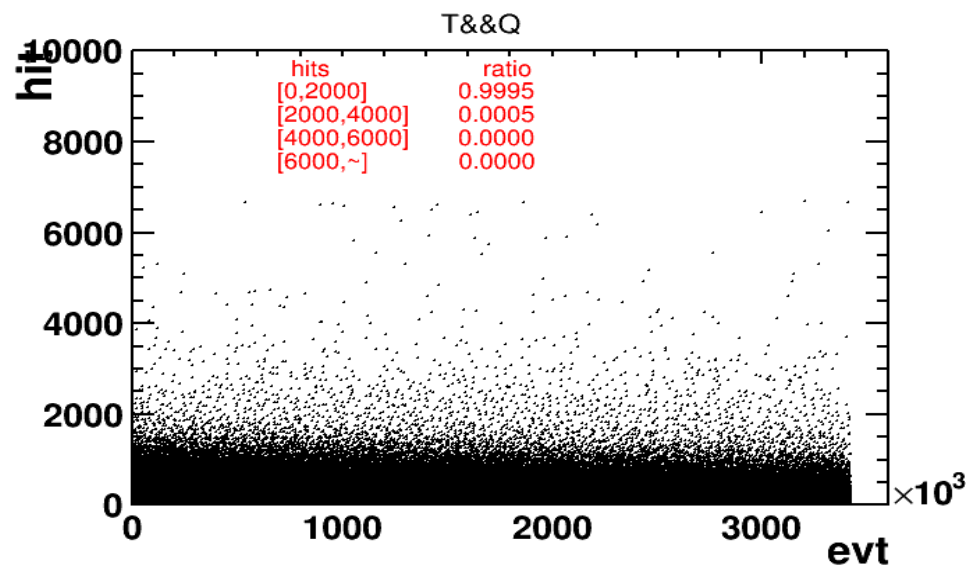
TOP-UP 模式数据分析

- 正常取数：束流注入时，束流本底大，探测器不取数。待注入完成束流稳定的时候才开始取数。但束流在储存环中运行，由于粒子丢失等原因，流强会越来越低，因此亮度也会越来越低，亮度低到一定程度就会停止这个run的取数，打掉束流重新注入，开始下一个run的取数
- Top-up模式：为了提高对撞亮度提出来的方案。在取数的过程中注入束流，以弥补流强下降造成的亮度损失。因为有注入，所以预期Top-up下本底可能会比以前高。预计在Top-up下积分亮度至少提高20%

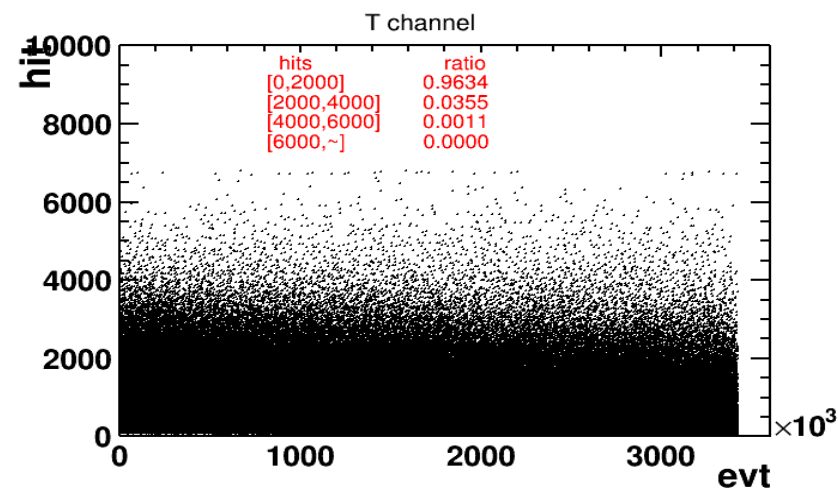
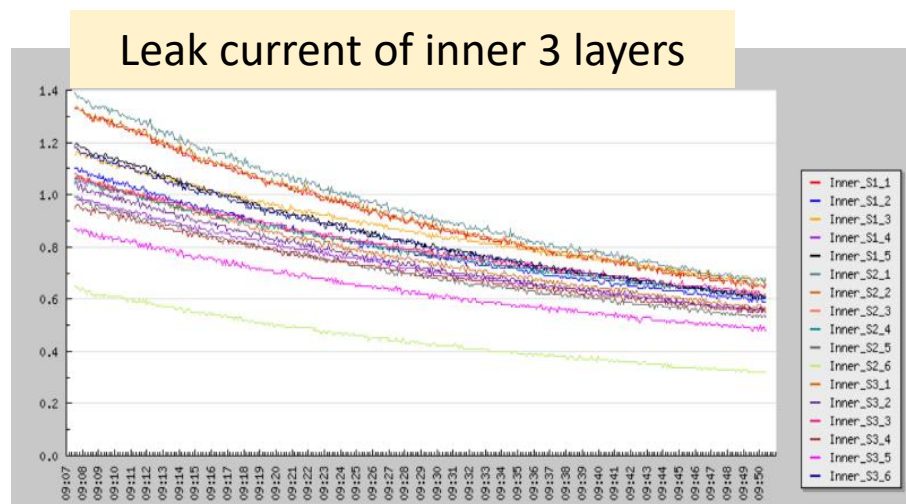
TOP-UP 模式数据分析

- 使用ALL数据，例如run_0060144_All_file001_SFO-1.raw....
- 对Top-up模式下所取数据的hit数随event的变化进行检查
 - ✓ 第一次3月19日 run 60144,60145,60146,60147
 - ✓ 第二次4月16日 run 60959,60960,60961,60962
 - ✓ 第三次5月7日 run 61593,61594,61595,61596,61597
 - ✓ 第四次6月17日 run 62790,62791,62792,62794,62795,62796,62797,62798,62799

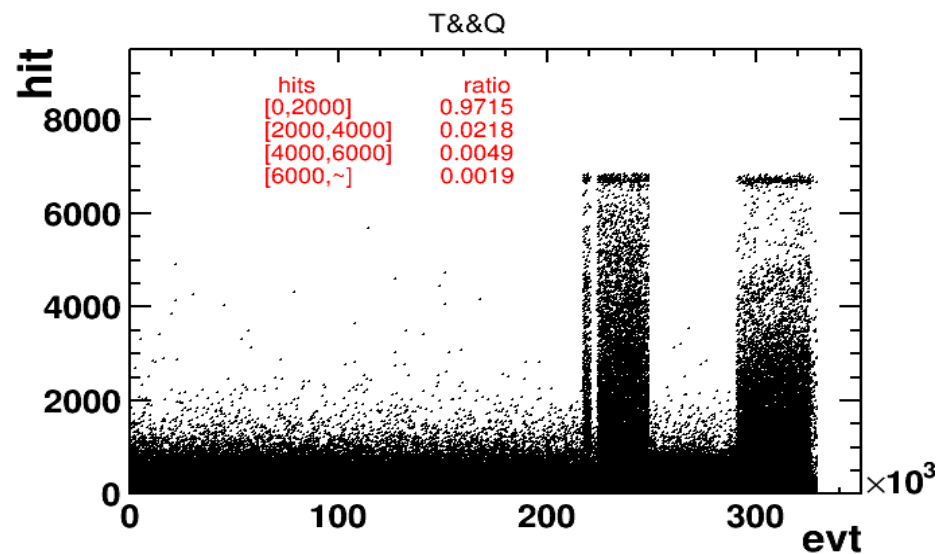
正常注入, Run 60112, 2019-03-18, 无屏蔽



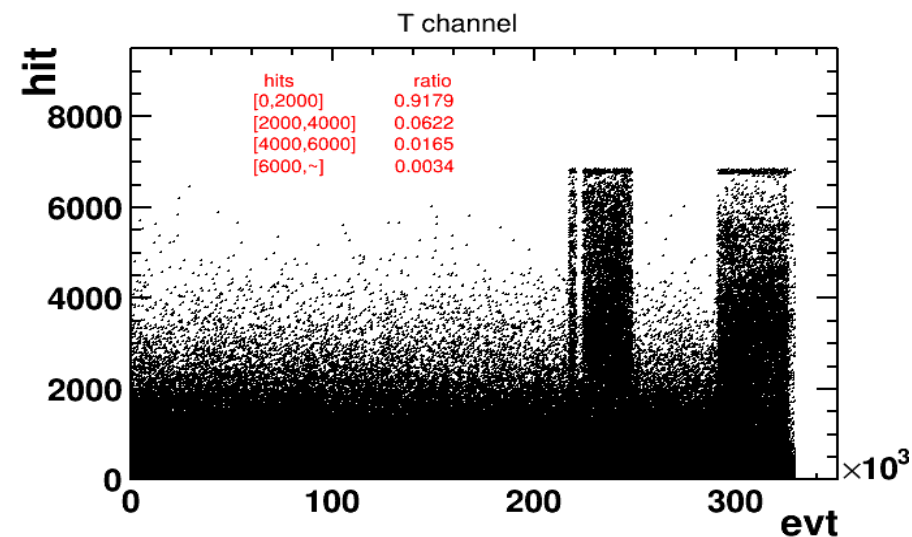
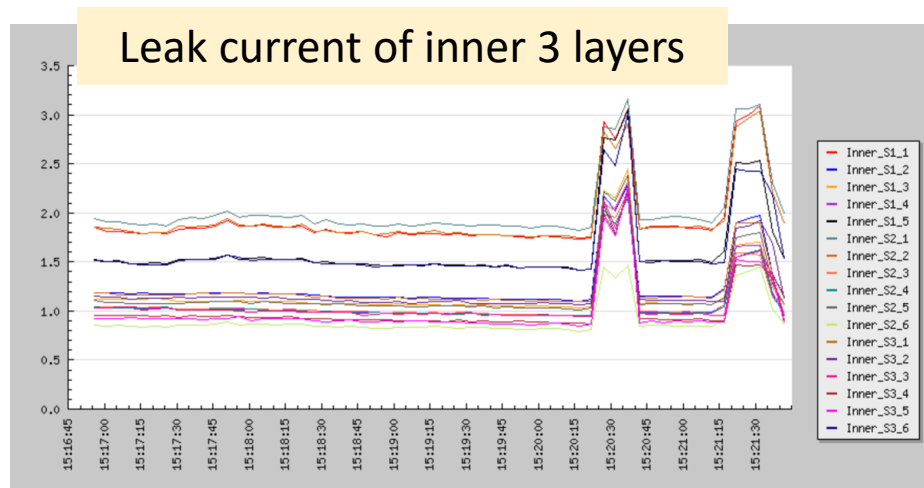
	T&Q (%)	T (%)	Q (%)
Ratio of 500<Nhits<1000	7.4	28.9	32.8
Ratio of 1000<Nhits<2000	1.0	16.8	43.2
Ratio of 2000<Nhits<4000	0.0	3.6	6.4
Ratio of 4000<Nhits<6000	0.0	0.1	0.0
Ratio of Nhits<2000	100	96.3	93.6
Occupancy of inner DC	10.6	17.2	19.5
Occupancy of outer DC	2.9	9.3	15.3



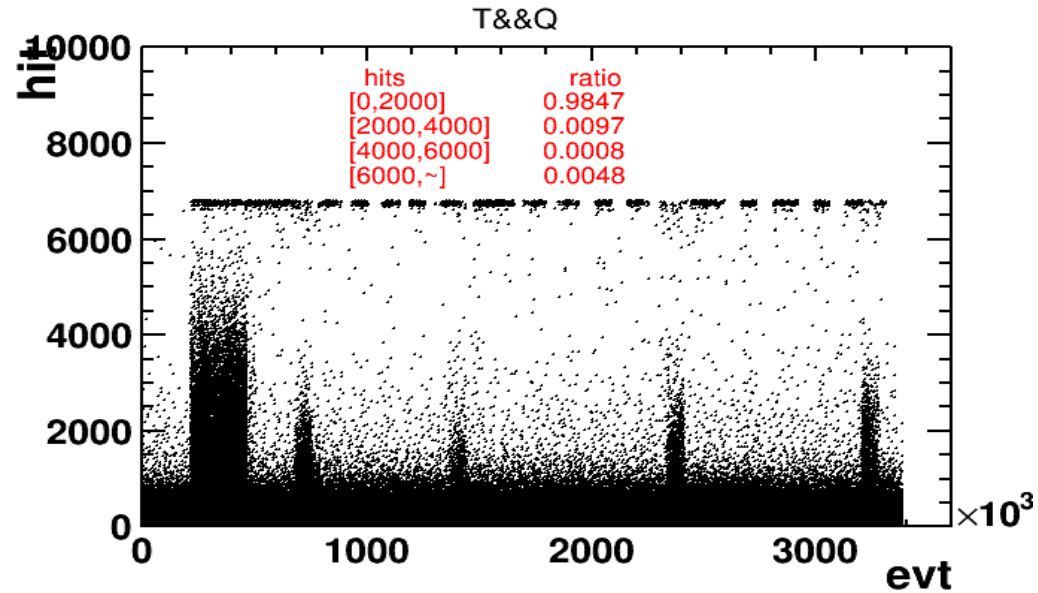
第一轮Top-up, Run 60144, 2019-03-19, 无屏蔽



	T&Q (%)	T (%)	Q (%)
Ratio of 500<Nhits<1000	6.5	23.7	32.0
Ratio of 1000<Nhits<2000	13.7	38.0	43.3
Ratio of 2000<Nhits<4000	2.2	6.2	9.0
Ratio of 4000<Nhits<6000	0.5	1.6	0.8
Ratio of Nhits<2000	97.2	91.8	90.0
Occupancy of inner DC	11.5	16.0	20.6
Occupancy of outer DC	4.5	11.0	16.1

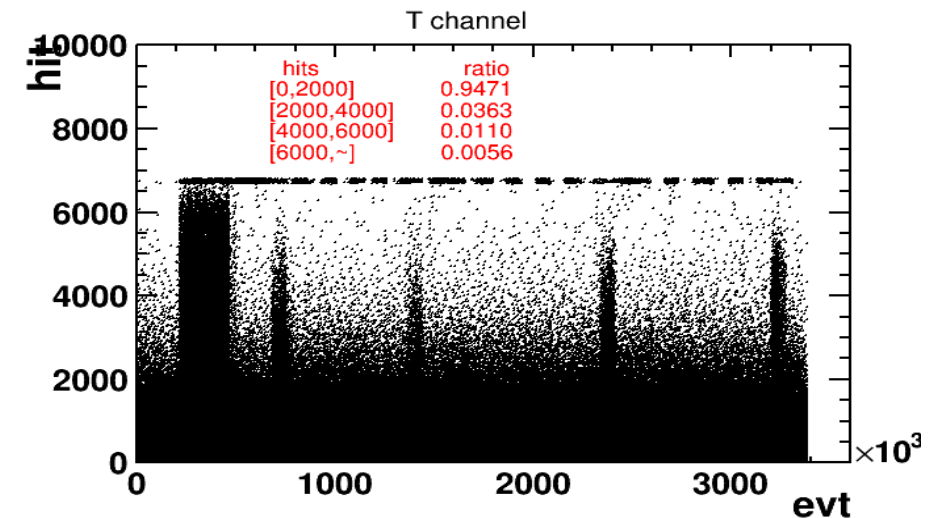
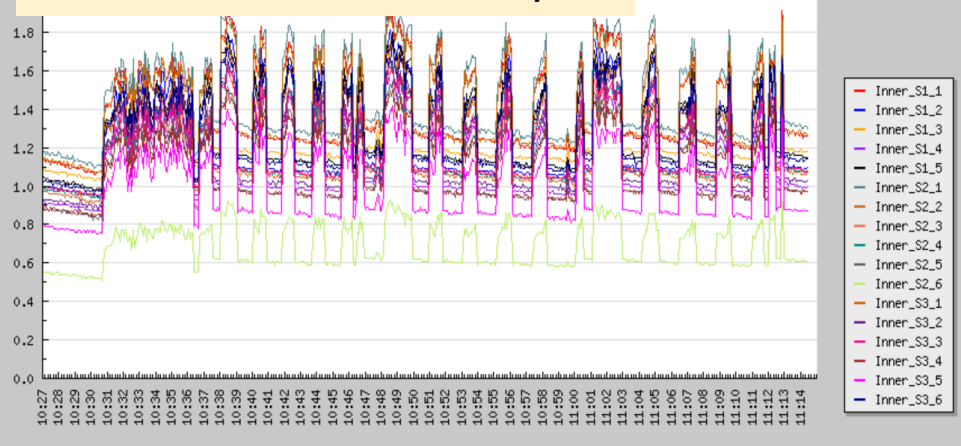


第二轮Top-up, Run 60961, 2019-04-16, 屏蔽1ms

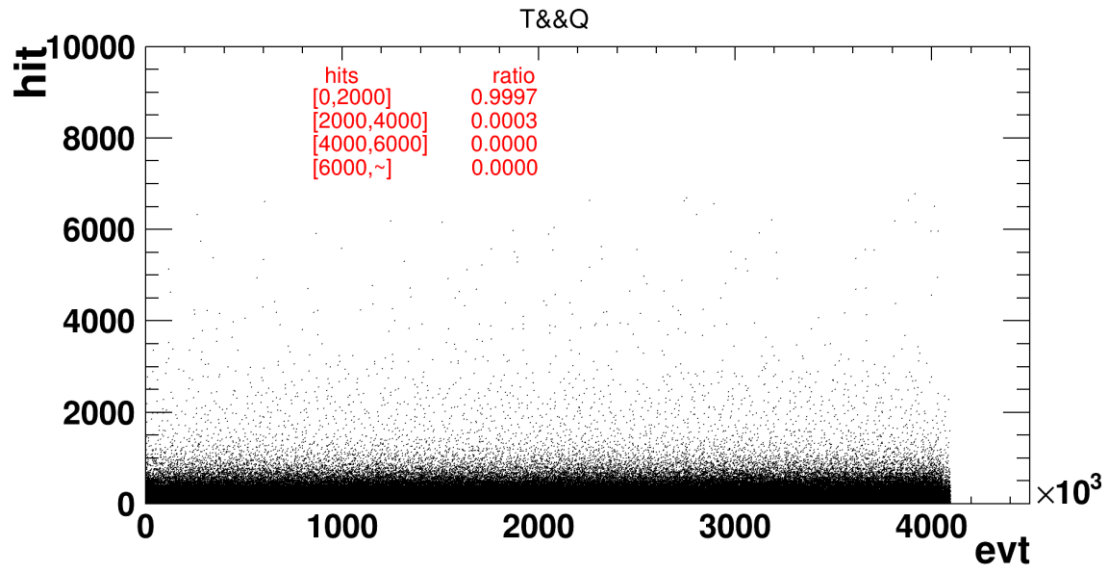


	T&Q (%)	T (%)	Q (%)
Ratio of 500<Nhits<1000	4.7	21.3	33.2
Ratio of 1000<Nhits<2000	1.9	10.2	36.2
Ratio of 2000<Nhits<4000	1.0	3.6	6.7
Ratio of 4000<Nhits<6000	0.1	1.1	0.2
Ratio of Nhits<2000	98.5	94.7	92.7
Occupancy of inner DC	9.7	13.8	18.0
Occupancy of outer DC	3.4	9.0	14.9

Leak current of inner 3 layers

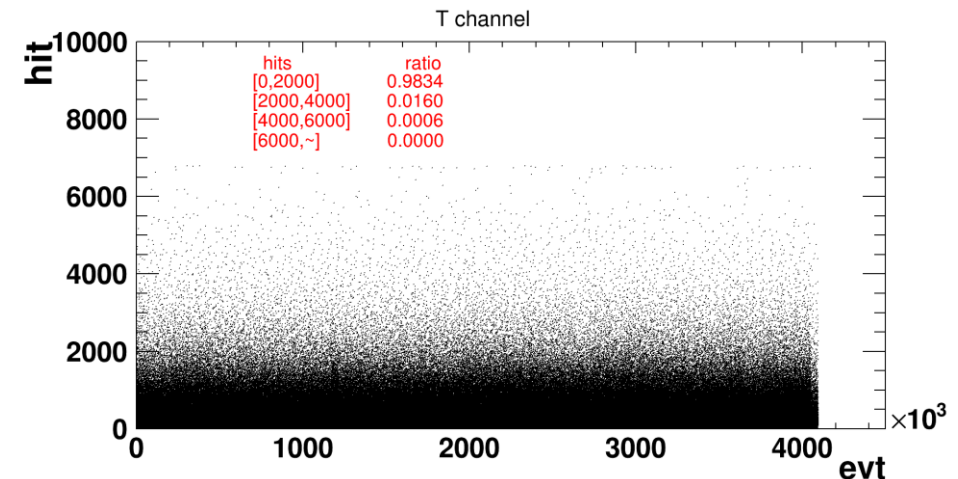
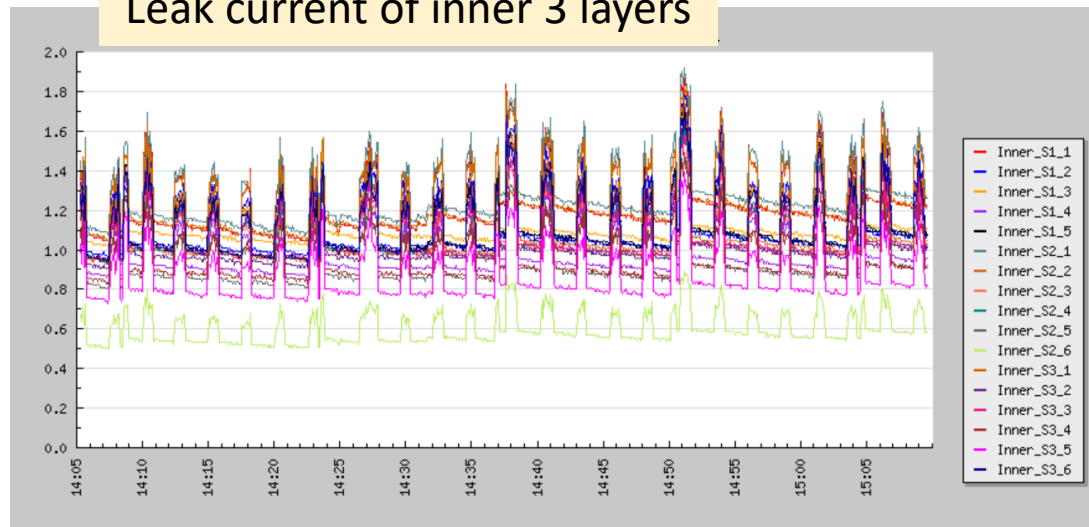


第三轮Top-up, Run 61593, 2019-05-07,延迟时间-10ms, 脉宽16ms

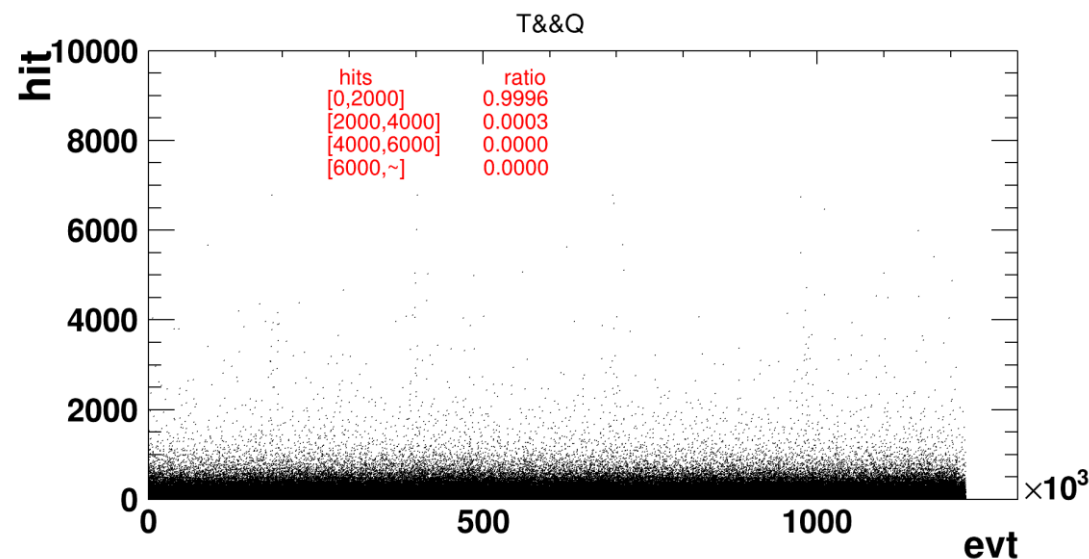


	T&Q (%)	T (%)	Q (%)
Ratio of 500<Nhits<1000	3.3	19.8	34.9
Ratio of 1000<Nhits<2000	0.4	8.4	34.5
Ratio of 2000<Nhits<4000	0.0	1.6	3.9
Ratio of 4000<Nhits<6000	0.0	0.0	0.0
Ratio of Nhits<2000	100.0	98.3	96.1
Occupancy of inner DC	8.0	11.3	15.6
Occupancy of outer DC	2.1	6.4	13.2

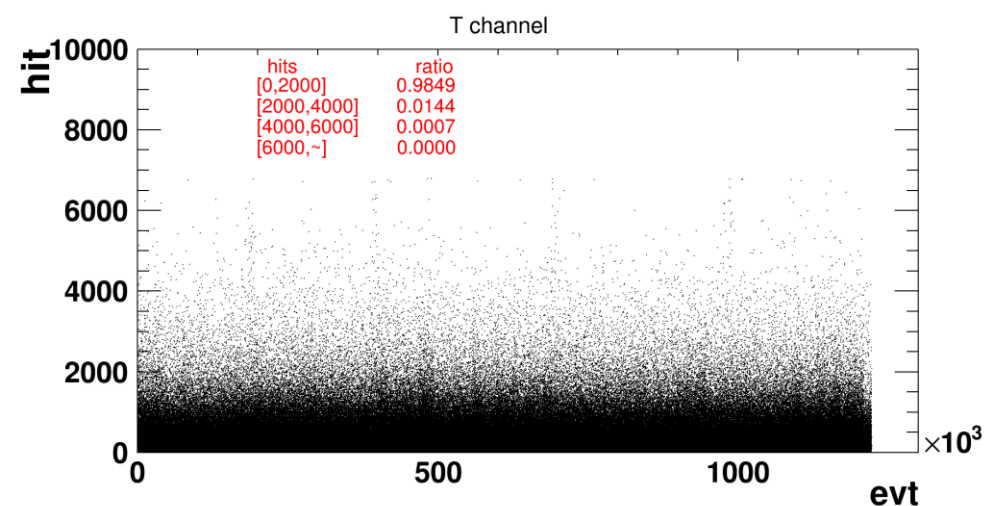
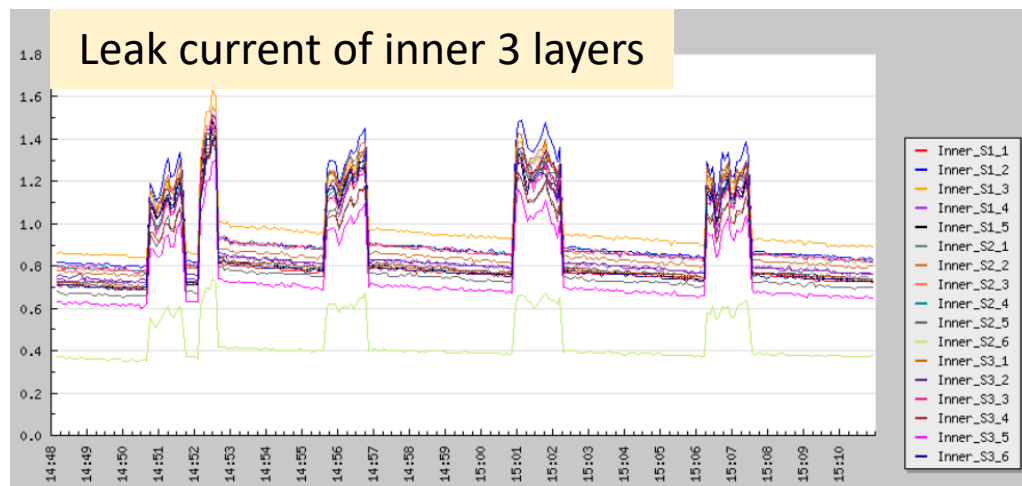
Leak current of inner 3 layers



第四轮Top-up, Run 62799, 2019-06-17,延迟时间-12ms, 脉宽16ms

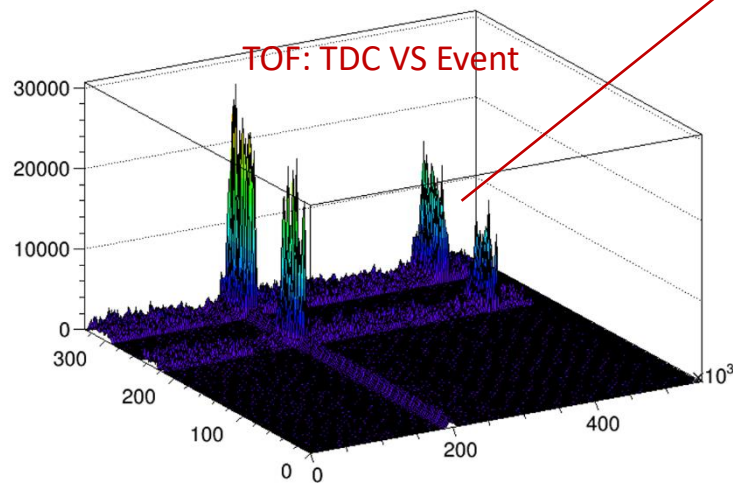
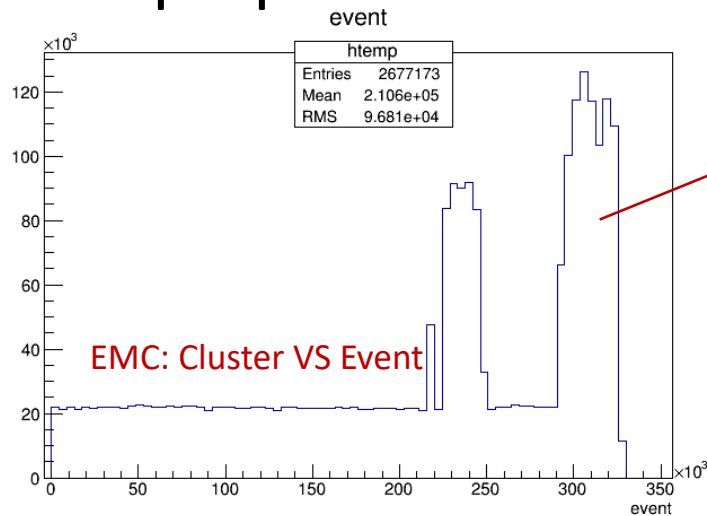


	T&Q (%)	T (%)	Q (%)
Ratio of 500<Nhits<1000	2.6	16.5	33.9
Ratio of 1000<Nhits<2000	0.4	7.0	29.8
Ratio of 2000<Nhits<4000	0.0	1.4	3.1
Ratio of 4000<Nhits<6000	0.0	0.1	0.0
Ratio of Nhits<2000	100	98.5	96.9
Occupancy of inner DC	6.6	9.7	13.6
Occupancy of outer DC	1.8	5.7	12.1

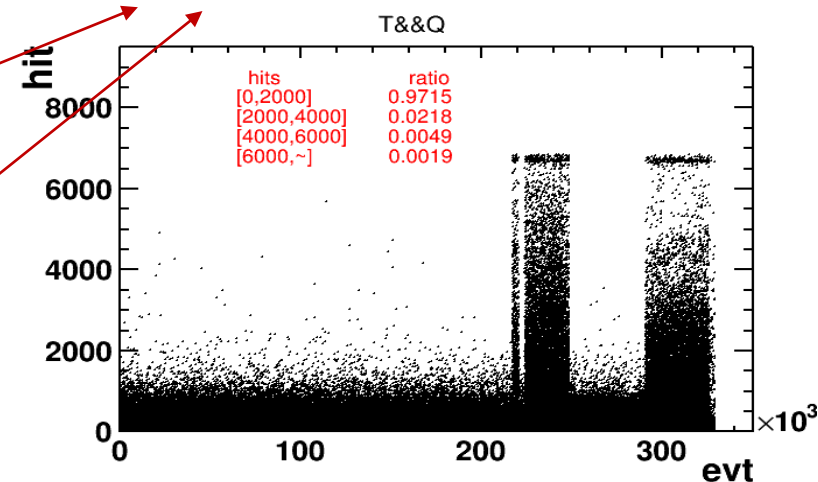


各子探测器的对比

Top-up Run 60144

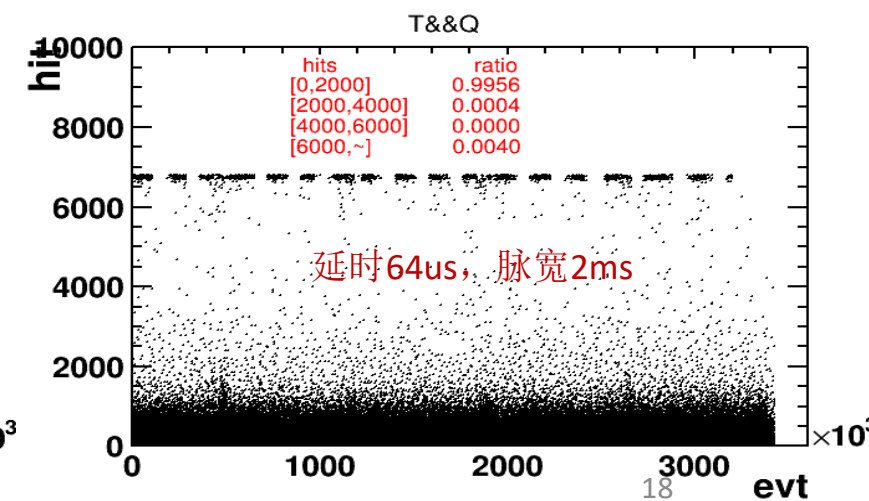
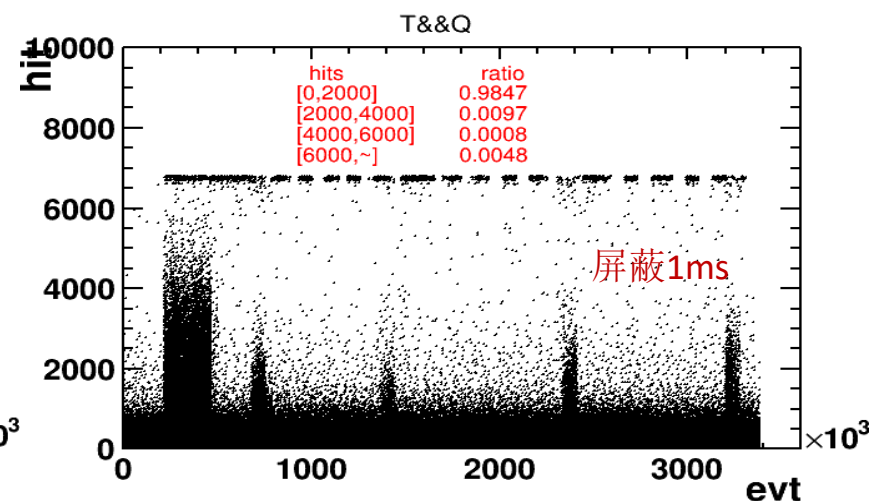
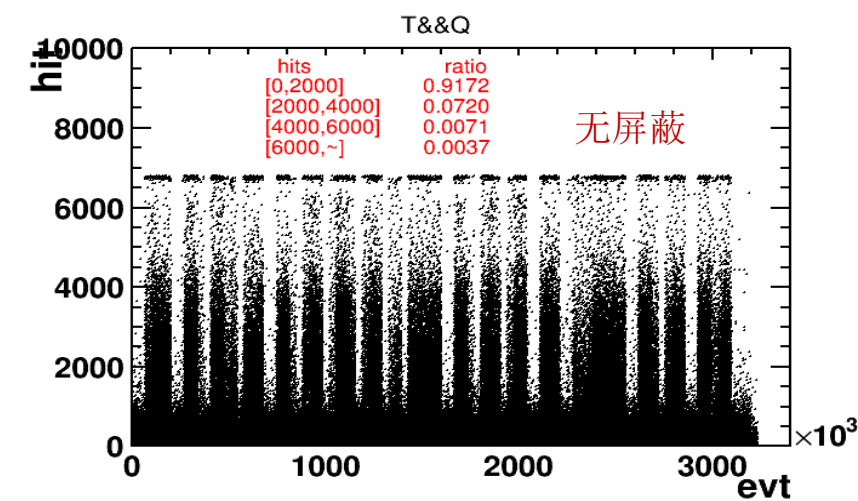
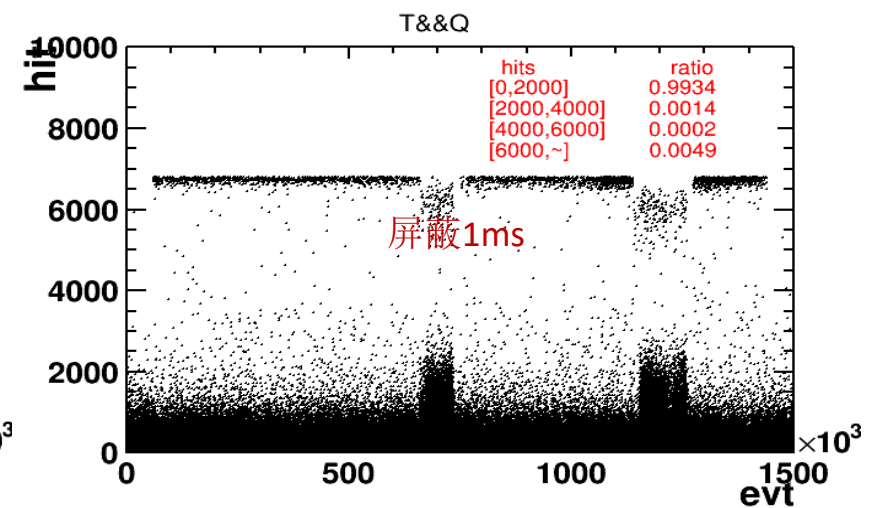
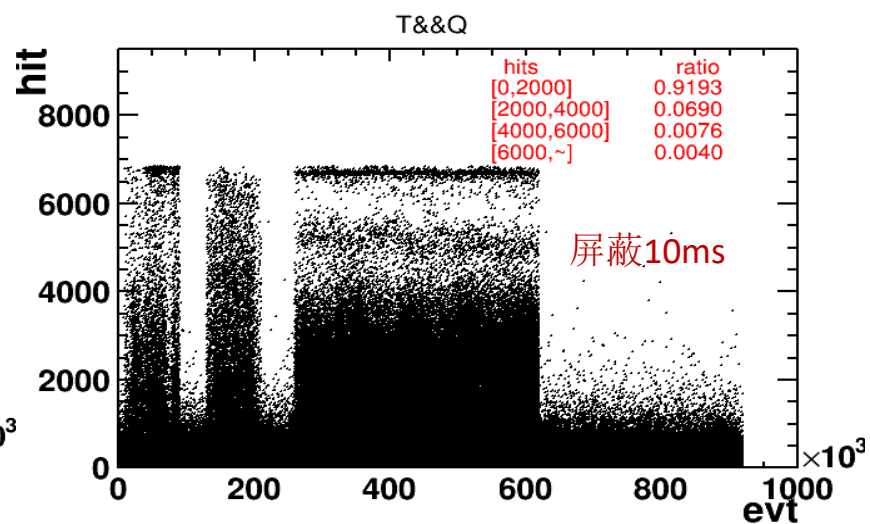
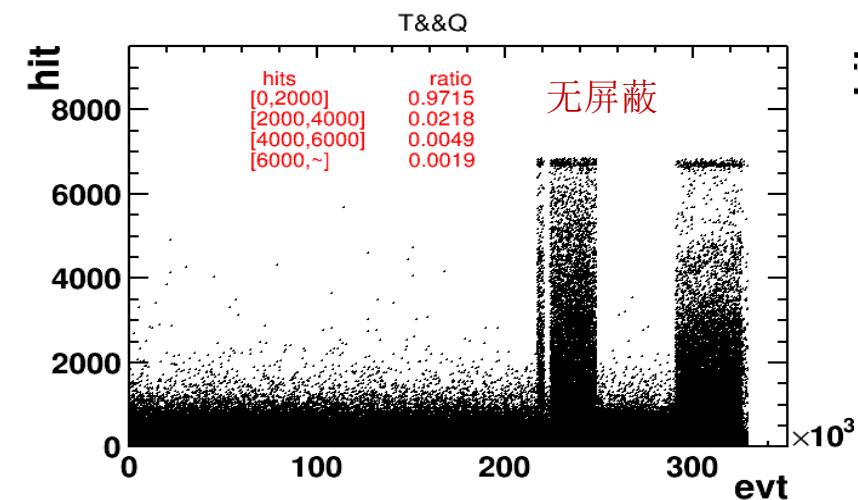


TOF, EMC, MDC有一致的表现

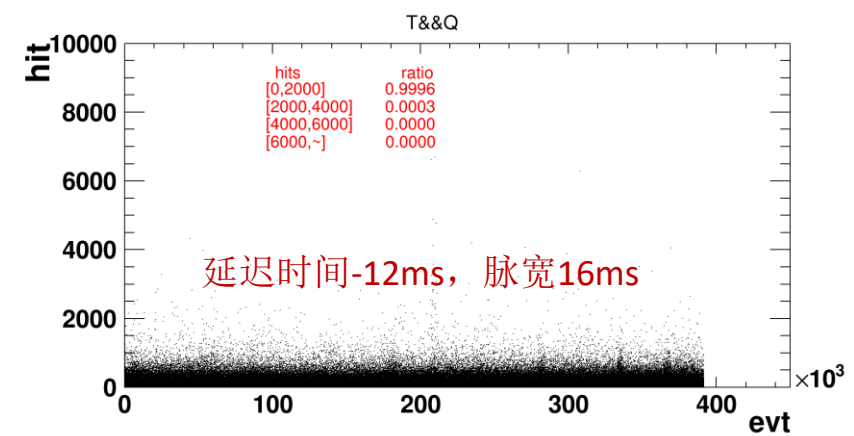
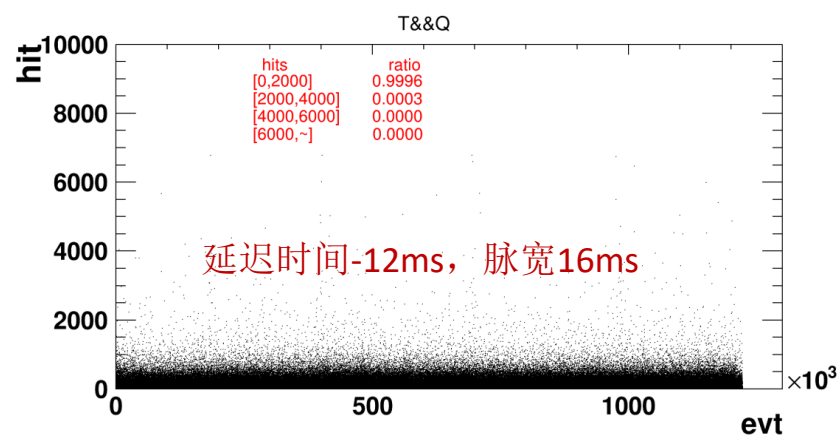
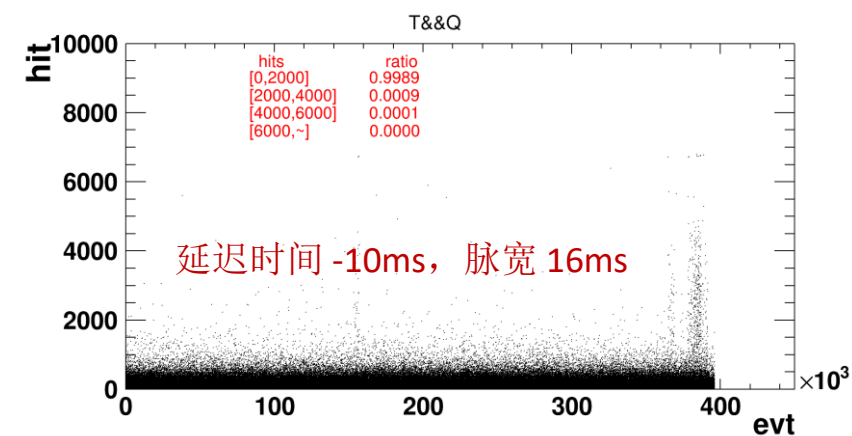
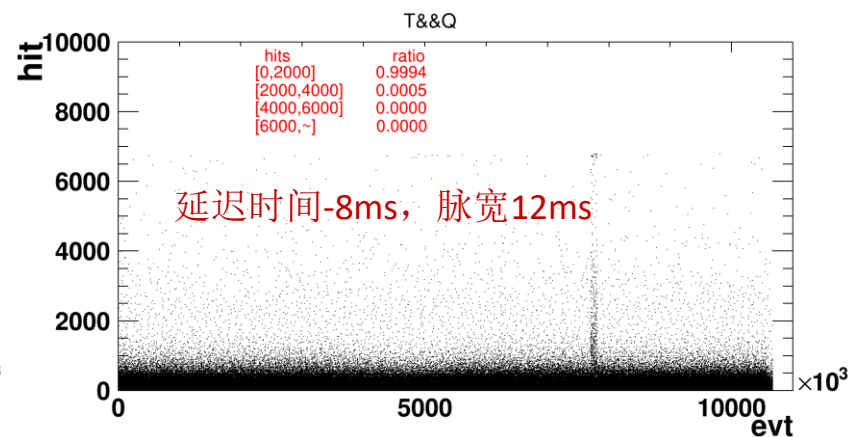
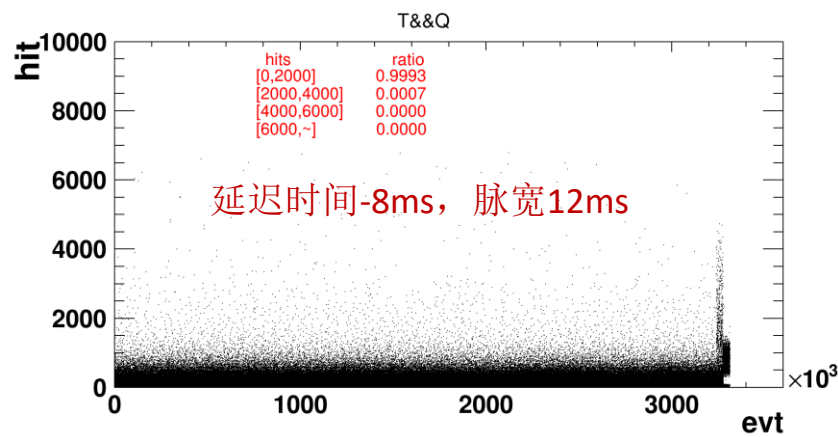
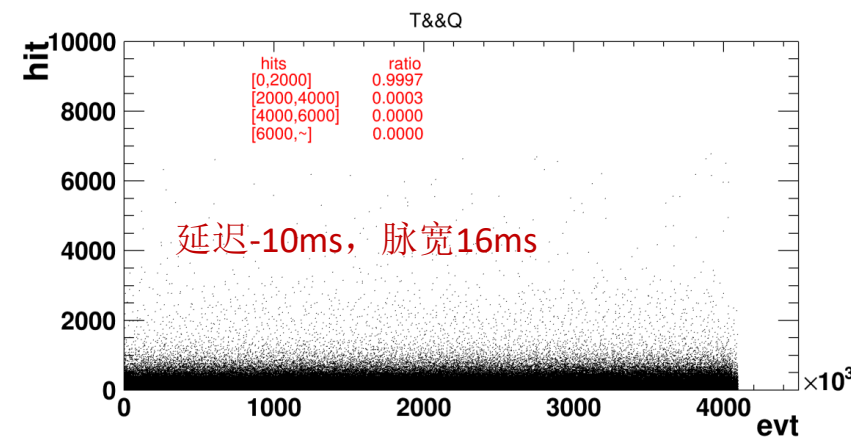


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Ratio of 4000<Nhits<6000	0.5	1.6	0.8
Ratio of Nhits<2000	97.2	91.8	90.0
Occupancy of inner DC	11.5	16.0	20.6
Occupancy of outer DC	4.5	11.0	16.1

四轮 TOP-UP 对比(第一二轮)



四轮 TOP-UP 对比(第三四轮)



总结

- MDC 的性能总体稳定
- 空间分辨率和击中效率受到噪声影响
- 对TOP-UP模式数据的检查各子探测器有一致的表现
- TOP-UP最终屏蔽和延时时间的确定还需要对各子探测器的效率，分辨率进行检查，现在受限于统计量的不足