

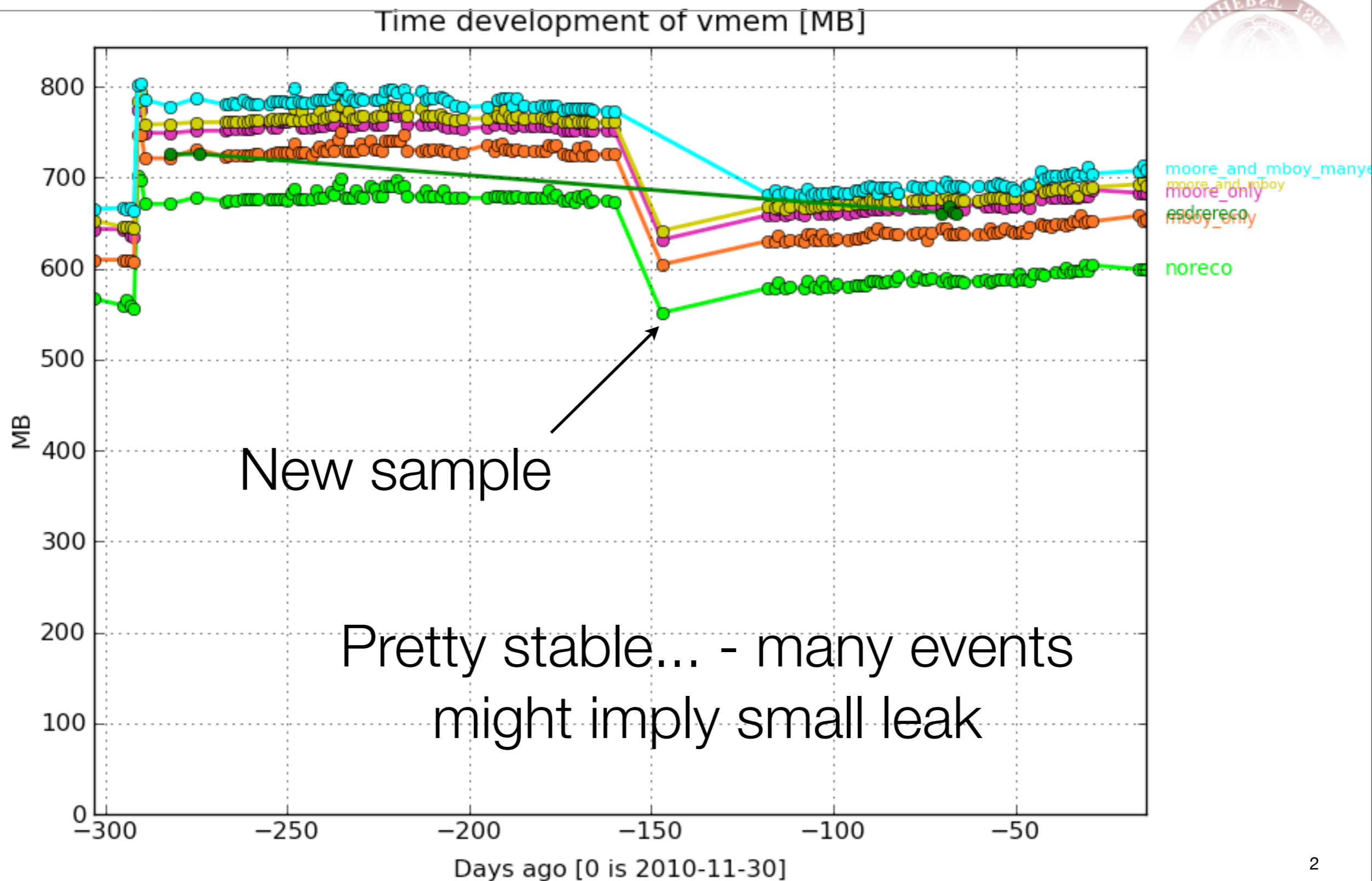


Muon PMB report

Edward Moyse



Memory consumption





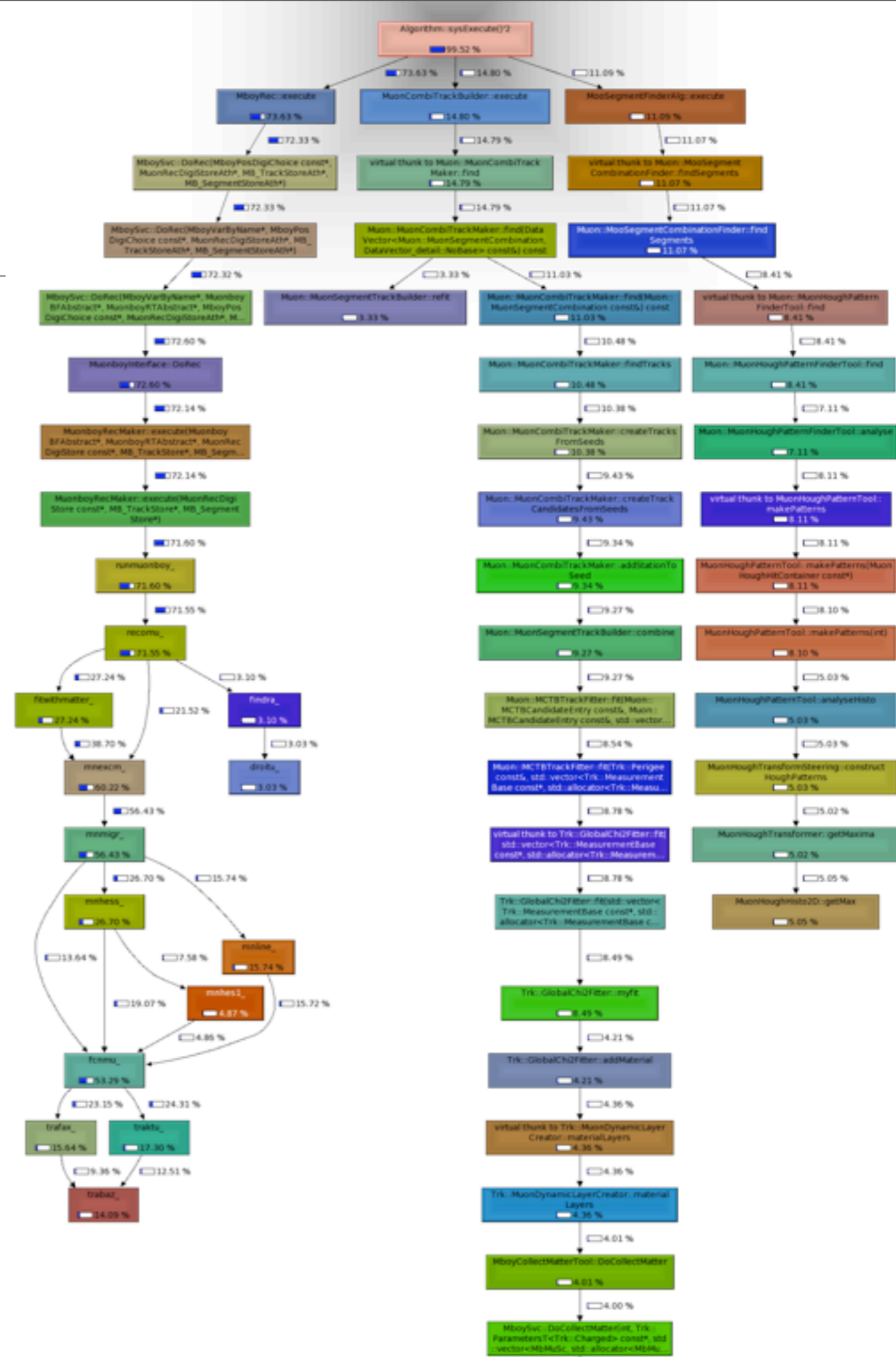
Update on performance

- Results from Muon Reco integration report (not yet released)
 - Performed on 16.0.2.3
- Can see that two algorithm chains are comparable in performance
 - Some recent improvements to Moore chain, particularly on challenging events
- For Moore, for most samples, track building dominates over segment finding.

Dataset	Moore (s/event)	Muonboy (s/event)	Dataset info
ttbar (semi-leptonic)	0.140±0.550 Segment: 0.034±0.036 Track: 0.106±0.514	0.216±0.578	mc09_7TeV. 105200.T1_McAtNlo_Jimmy. digit.RDO.e510_s624_s633_ d287_tid112426_00/RDO. 112426_000XXX.pool.root. 1 500 events
JPsi	0.255±0.160 Segment: 0.048±0.015 Track: 0.207±0.145	0.649±0.485	mc09_7TeV. 108407.Pythia_directjpsimu4 mu4.digit.RDO.e477_s624_s6 33_d287_tid112432_00/ RDO. 112432_000020.pool.root.1 2000 events
Z→μμ	0.175±0.202 Segment: 0.038±0.031 Track: 0.137±0.171	0.294±0.456	mc09_7TeV. 106047.PythiaZmumu_no_filt er.digit.RDO.e468_s624_s633 _d238_tid105398_00/RDO. 105398_000XXX.pool.root. 1 10000 events
H→4l	0.196±0.299 Segment: 0.040±0.030 Track: 0.156±0.269	0.366±0.602	user08.KeteviAAssamagan. 005300.PythiaH130zz4l.RDO. pool.v2.EXT0_00XXX.RDO. pool.root 500 events
H→4l (cavern background: safety factor 5)	0.84±0.396 Segment: 0.491±0.057 Track: 0.349±0.339	0.837±0.565	user08.KeteviAAssamagan. 005008.005300PythiaH130zz 4lSF05.RDO.pool.v2.EXT0_0 0003.005300.PythiaH130zz4l. sf05.RDO.pool.root 500 events
difficult	34.7±37.1 Segment: 16.0±13.8 Track: 18.7±23.3	65.6±57.4	run 143461, events: (814768, 1927091, 783119, 1714436, 1294905, 4885222, 4658396, 4569443, 4759855, 4716249), 10 events.
real data	0.273±1.06 Segment: 0.153±0.313 Track: 0.165±747	0.597±0.744	/castor/cern.ch/atlas/ atlaserngroupdisk/det- muon/Bytestream2010/ MuonBytestreamRun155697 _selectedCbMu10Events_rec 15.6.10.ESD.pool.root, 1409 events

Callgrind

- More detailed look with callgrind (10 events)
- For this sample (the picture changes a bit with more events)
 - For both Moore and Muonboy, material lookup is a significant contribution ...
- But in general, we're focussing on merging Moore + Muonboy:
 - Any small improvements we make optimising current algorithms will be dwarfed by the savings made by moving to one chain.



Consequences of moving to full asymmetric map

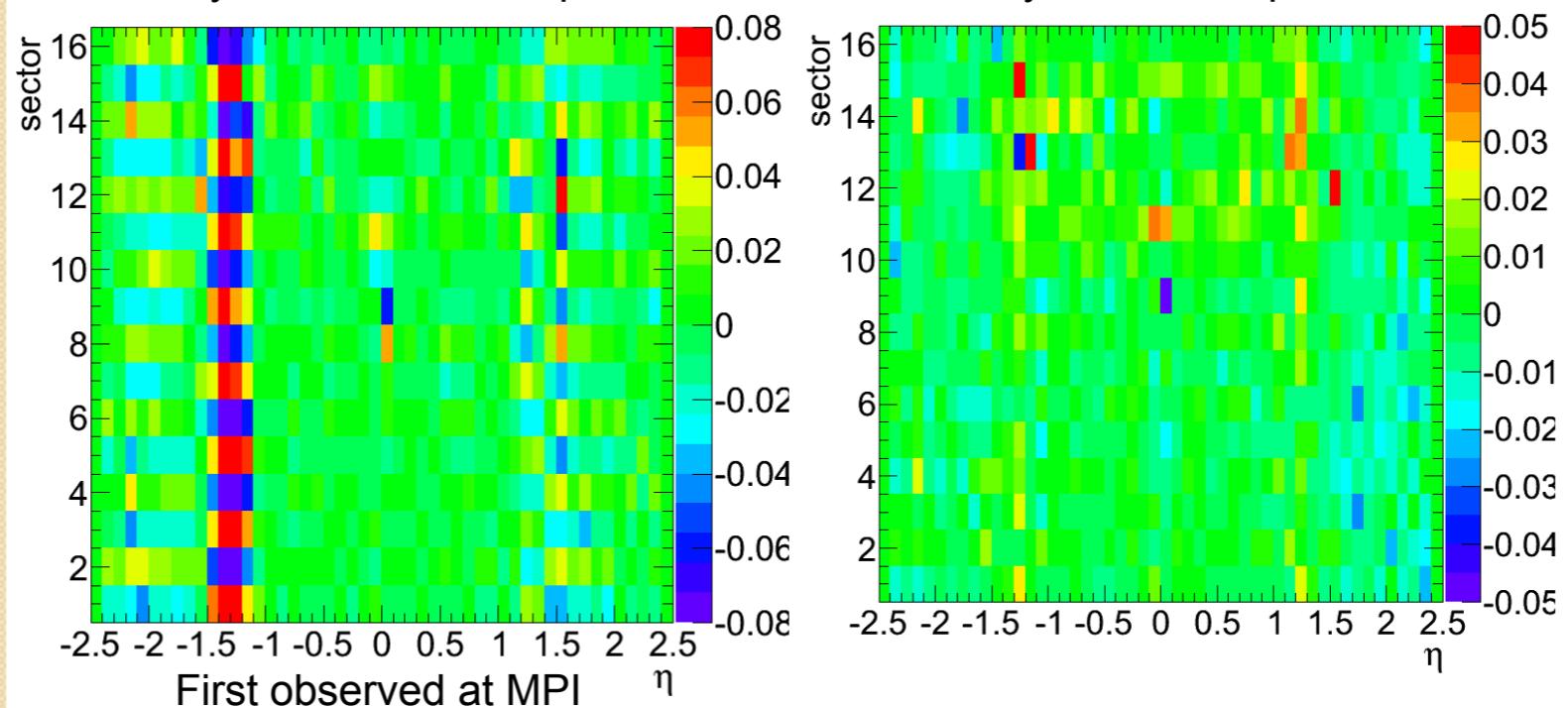
- Motivation:

Peter Kluit - Muon Week Plenary 12/11/2010

Momentum resolution: B field

- Use muons $p_T > 15$ GeV
- $\Delta p/p = \text{average}(p_{ID} - p_{MS}) / p_{ID}$ (no charge)
- Huge improvement from up to $\Delta p/p \sim 0.08$ in Transition
- To better than 0.01 almost everywhere

Symmetric Field map \longrightarrow Asymmetric map

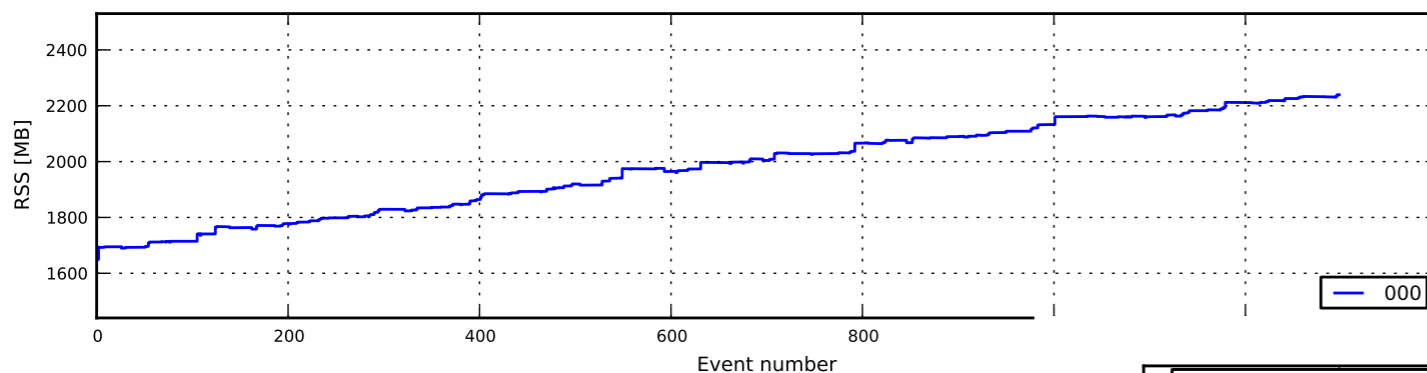
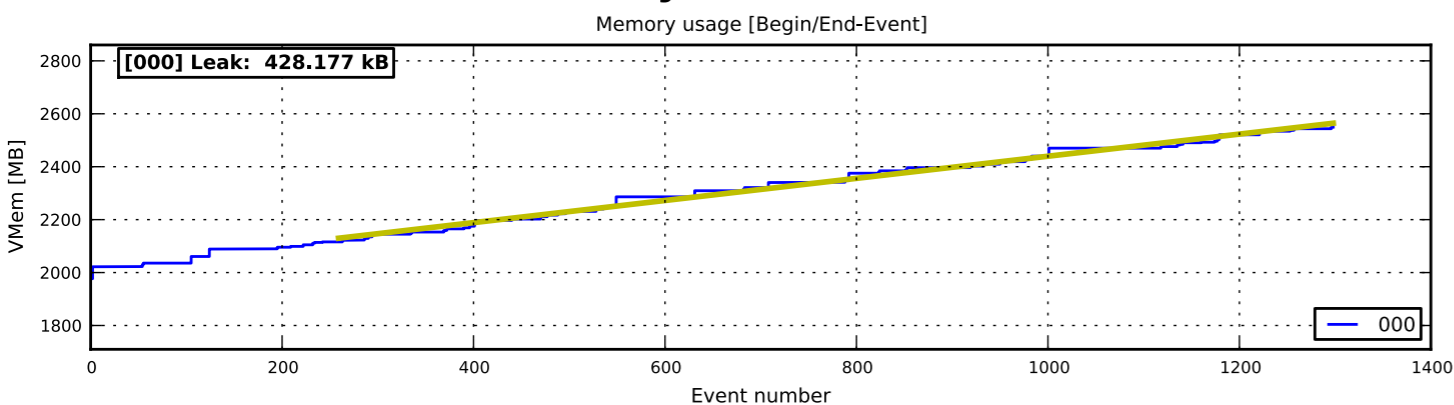


<http://indico.cern.ch/getFile.py/access?contribId=4&resId=1&materialId=slides&confId=113434>

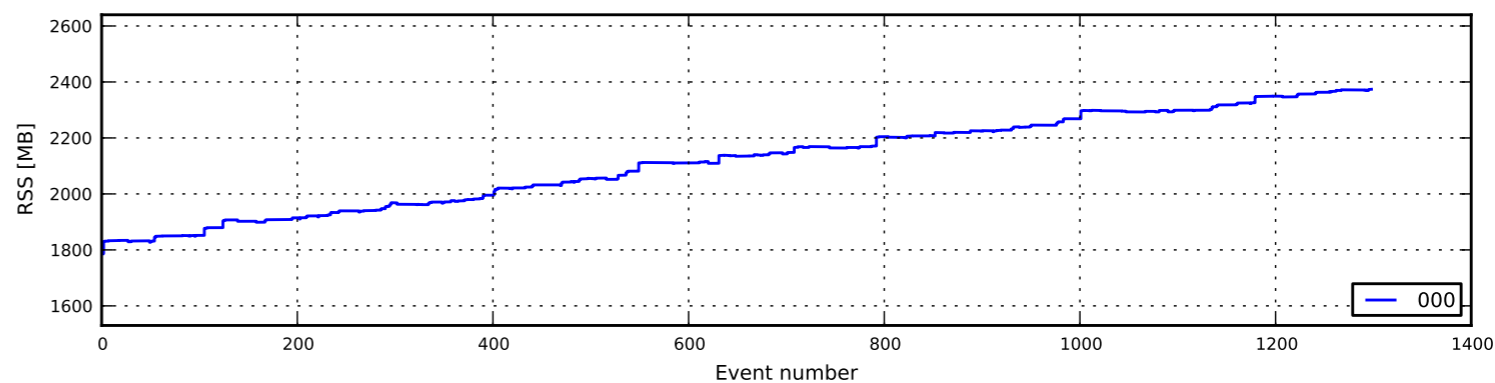
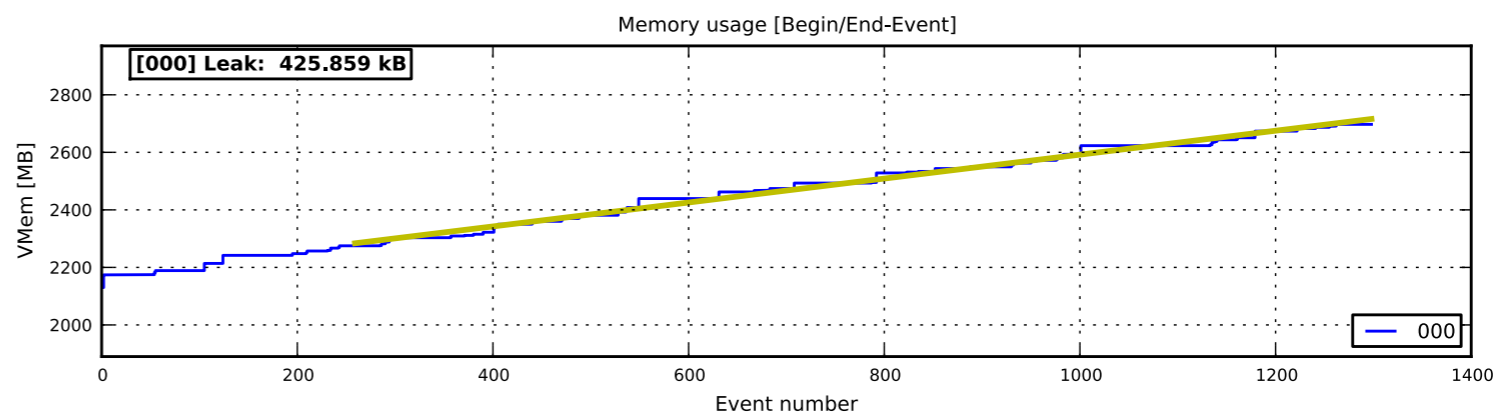


Asymm map: Overall vmem

No Asymm



Asymm



Overall, takes
~150Mb more



Asymm map: Average CPU (execute)

No Asymm

Asymm

[cpu/sys]	1065.832	0.462 (ms)	InDetAmbiguitySolver	[cpu/sys]	1084.407	0.455 (ms)	InDetAmbiguitySolver
[cpu/sys]	683.675	9.414 (ms)	StreamESD	[cpu/sys]	686.441	9.299 (ms)	StreamESD
[cpu/sys]	562.635	0.154 (ms)	MboyRec	[cpu/sys]	491.271	0.247 (ms)	MboyRec
[cpu/sys]	421.202	0.254 (ms)	InDetSiSpTrackFinder	[cpu/sys]	420.955	0.293 (ms)	MuTagMasterIMO
[cpu/sys]	420.863	0.354 (ms)	MuTagMasterIMO	[cpu/sys]	420.516	0.193 (ms)	MuTagAllStations
[cpu/sys]	420.478	0.262 (ms)	MuTagAllStations	[cpu/sys]	419.091	0.169 (ms)	InDetSiSpTrackFinder
[cpu/sys]	277.165	0.131 (ms)	InDetTRT_TrackSegmentsFinder	[cpu/sys]	276.649	0.123 (ms)	InDetTRT_TrackSegmentsFinder
[cpu/sys]	209.276	0.100 (ms)	MuGirl	[cpu/sys]	203.698	0.108 (ms)	CaloCellMaker
[cpu/sys]	204.129	0.177 (ms)	CaloCellMaker	[cpu/sys]	203.382	0.069 (ms)	MuGirl
[cpu/sys]	202.250	0.131 (ms)	CaloTopoCluster	[cpu/sys]	202.388	0.123 (ms)	CaloTopoCluster
[cpu/sys]	197.080	0.100 (ms)	InDetExtensionProcessor	[cpu/sys]	198.837	0.108 (ms)	InDetExtensionProcessor
[cpu/sys]	192.042	0.116 (ms)	MuonCombiTrackBuilder	[cpu/sys]	179.800	0.077 (ms)	MuonCombiTrackBuilder
[cpu/sys]	156.048	0.100 (ms)	METAlg	[cpu/sys]	156.980	0.077 (ms)	MuonCombinedRefit
[cpu/sys]	155.963	0.062 (ms)	MuonCombinedRefit	[cpu/sys]	155.578	0.131 (ms)	METAlg
[cpu/sys]	150.169	1.502 (ms)	egamma	[cpu/sys]	149.800	0.116 (ms)	AntiKt6TowerJets
[cpu/sys]	149.206	0.177 (ms)	AntiKt6TowerJets	[cpu/sys]	148.598	1.710 (ms)	egamma
[cpu/sys]	135.092	0.092 (ms)	MuonRpcRawDataProvider	[cpu/sys]	136.225	0.062 (ms)	MuonRpcRawDataProvider
[cpu/sys]	134.730	0.169 (ms)	AntiKt4TowerJets	[cpu/sys]	135.108	0.077 (ms)	AntiKt4TowerJets
[cpu/sys]	120.239	0.062 (ms)	MooSegmentMaker	[cpu/sys]	120.686	0.092 (ms)	MooSegmentMaker
[cpu/sys]	108.582	0.046 (ms)	InDetTrackCollectionMerger	[cpu/sys]	109.753	0.046 (ms)	InDetTrackCollectionMerger
[cpu/sys]	104.276	0.123 (ms)	AntiKt6TopoJets	[cpu/sys]	104.738	0.077 (ms)	AntiKt6TopoJets
[cpu/sys]	98.606	0.062 (ms)	InDetSCT_Clusterization	[cpu/sys]	98.367	0.046 (ms)	InDetSCT_Clusterization

Total real=7942.563 ms Total real=7860.626 ms



Conclusions

- Muon SW in pretty good shape.
- Focus from now on is merger of Moore+Muonboy
 - Won't gain us much in memory, if at all. But will be ~50% of current CPU.
- New asymmetric map requires a lot more memory... but is necessary.