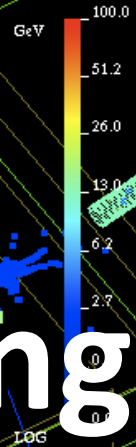




Linear Collider Benchmarking or Can you make a few slides ?

Marcel Stanitzki
Ringberg

02/05/2017

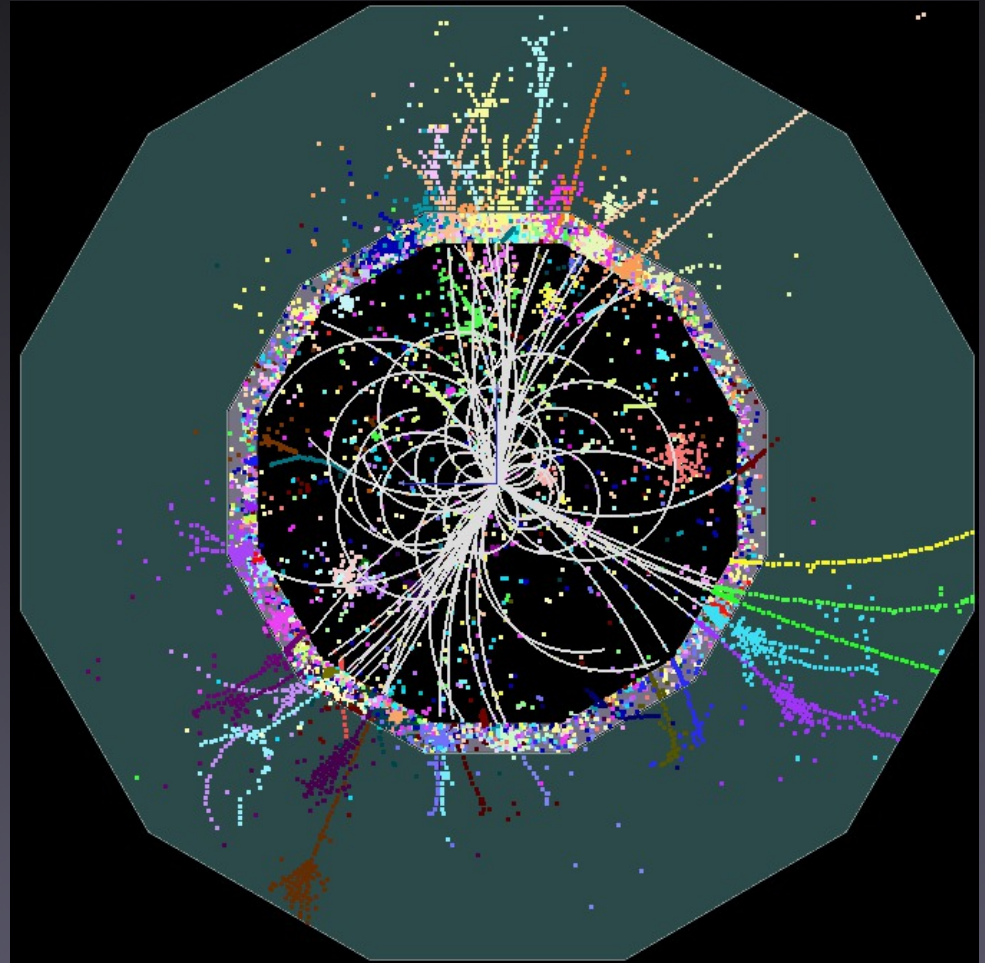




LC Software Status



- The Status of the Software is unprecedented for a project in this state
 - Full simulation
 - Complete reconstruction
- E.g. LHC experiments in preparation stage
 - Fast simulation only





What kind of benchmarks



- Physics Benchmarks
 - Make the physics cases
- Sub-Detector Performance Benchmarks
 - Test Tracking, Vertexing ...
- Detector Performance Benchmarks
 - Compare Detector A vs. B vs. C





Benchmarks for Lol and DBD



Benchmark	E_{CMS}	Report	Comments
$e+e- \rightarrow ZH \rightarrow ee/\mu\mu + \text{anything}$	250	Lol	Recoil mass measurement
$e+e- \rightarrow ZH \ H \rightarrow cc, Z \rightarrow qq, \nu\nu$	250	Lol	Charm tagging
$e+e- \rightarrow ZH \ H \rightarrow \mu\mu, Z \rightarrow qq, \nu\nu$	250	Lol	Tracking
$e+e- \rightarrow tt \rightarrow 6 \text{ jets}$	500	Lol	Jets/PFA/b-tagging
$e+e- \rightarrow \tau\tau$	500	Lol	Polarization, τ -ID,
$e+e- \rightarrow \chi_2^0 \chi_2^0, \chi_1^0 \chi_1^+$	500	Lol	PFA
$e+e- \rightarrow \nu\nu H \ H \rightarrow bb, cc, gg, \mu\mu$	1000	DBD	Flavor Tagging, Tracking
$e+e- \rightarrow WW$	1000	DBD	Polarization
$e+e- \rightarrow ttH$	1000	DBD	B-tagging, PFA
$e+e- \rightarrow tt \rightarrow 6 \text{ jets}$	500	DBD	Re-Spin of Lol Analysis





What did we Achieve ?



- Exercising the entire chain
 - Sim, Reco, Analysis, Running on the Grid, Grid Tools and Storage
- Strengthen the physics case
 - Underline Physics capabilities
 - Showcase what ILC detectors can do
- Made a strong impression
 - Also triggered interest by the circular machines
- ILC TDR is considered “gold-standard” for this kind of documents





Where did this fail



- Especially for the Lol
 - Showcase the performance differences of the detectors
 - Provide Input for detector down-select (3 → 2)
- Unfortunately for Benchmark Results
 - Detector x Reconstruction Software x Analysis
- Not as conclusive as IDAG intended at the time





And for the CLIC CDR



Benchmark	E_{CMS}	Report	Comments
$e+e- \rightarrow tt$	500	CDR	Jets/PFA/b-tagging
$e+e- \rightarrow \chi_2^0 \chi_2^0, \chi_1^- \chi_1^+$	3000	CDR	PFA
$e+e- \rightarrow \nu\nu H \rightarrow bb, cc, gg, \mu\mu$	3000	CDR	Flavor Tagging, Tracking
$e+e- \rightarrow HA \rightarrow bbbb$	3000	CDR	B-tagging, PFA
$e+e- \rightarrow H^+ H^- \rightarrow tbtb$	3000	CDR	B-tagging, PFA
$e+e- \rightarrow \tilde{q} \tilde{q}$	3000	CDR	PFA, Tracking
$e+e- \rightarrow \tilde{l} \tilde{l}$	3000	CDR	Tracking, PFA

- Most Important Message
 - CLIC will deliver physics at 3 TeV
 - In spite of severe backgrounds and tiny bunch spacing





A few discussion points



- Do we need more physics studies ?
- Do we need performance benchmarks
- Do we need common tools that work with more than one layout ?
- Key parameters for vertex/tracker performance we'd like to compare ?
- How does raw performance translate into physics ?
- Ho to have more consistency? -Everyone uses his "own" set with often deprecated parameter sets
- Can we move away from these drop-dead points ?

