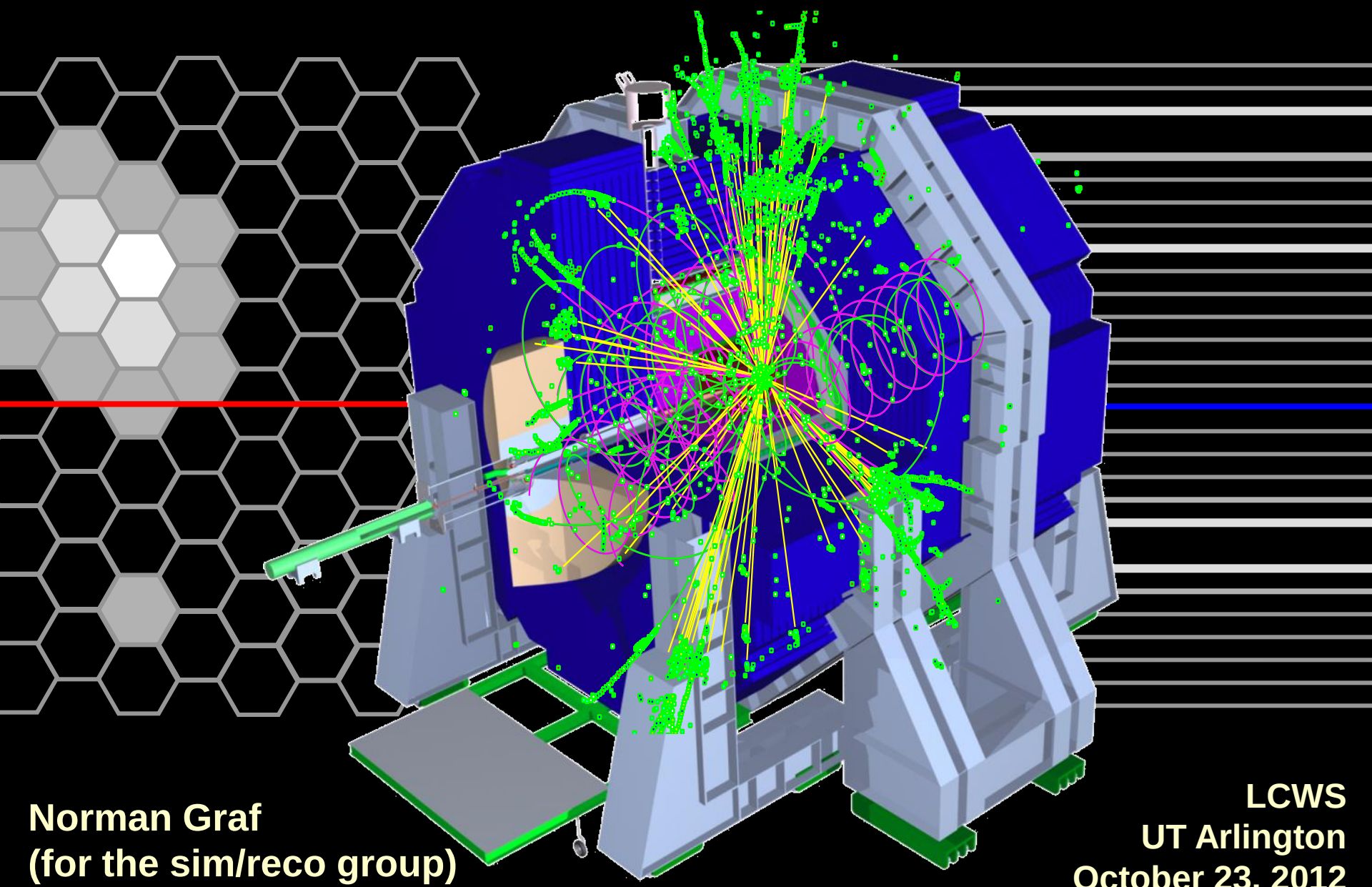
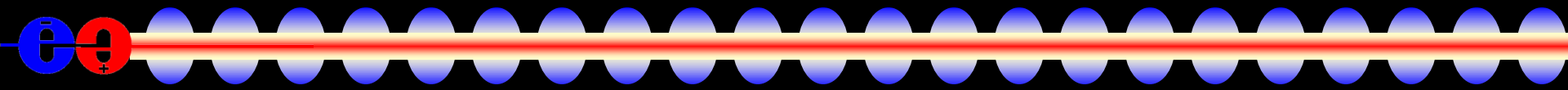
ALCPG software: status and future plans



Norman Graf
(for the sim/reco group)

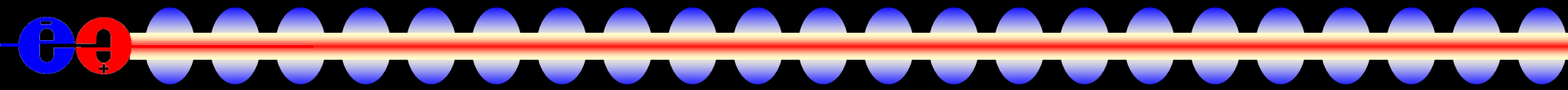
LCWS
UT Arlington
October 23, 2012

The DBD and beyond



- ILC DBD has been the primary focus of our group
  - Will hear a number of talks presenting the status of our DBD efforts
  - A lot of work done by a small number of dedicated individuals who deserve a lot of credit.
- Have also been supporting the needs of HPS
  - real data requirements mostly orthogonal to MC challenge, but will be useful for upcoming Ecal TB
- Gearing up to support Snowmass 2013 efforts
- Looking forward to common software development

DBD Deliverables

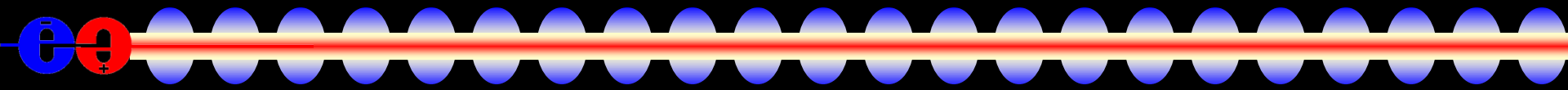


- Results expected for inclusion in DBD
  - Full simulation of realistic detector design including support structures.
  - Overlay of correct admixture of expected beam-related backgrounds.
  - Full tracker hit digitization and ab initio track finding and fitting.
  - Digital RPC signal simulation, including cross-talk, noise & inefficiencies.
  - Full reconstruction using slicPandora & LCFIVertex (LCFIPlus if available)

The Grid

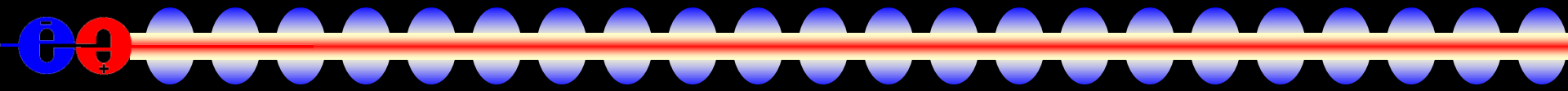
- SiD is making full use of Grid via ILCDirac.
- LCG and OSG ILC VOs merged
- Identifying OSG resources and making good use of them has been a challenge.
  - very idiosyncratic
  - large, steep and site-dependent learning curve
- But when it works it works very well.
- See talk by Jan Strube.

Snowmass 2013



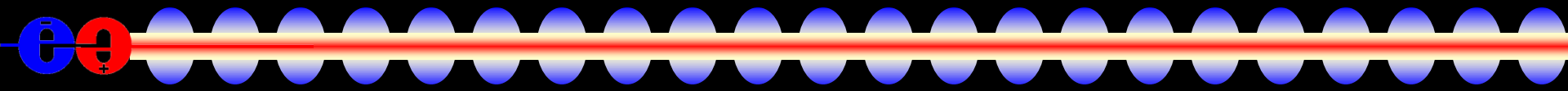
- The APS DPF will host a meeting in Minneapolis in the late spring of next year (SnowMiss).
- The ALCPG sim/reco group will be providing support for physics and detector studies to be conducted leading up to and during the ~one week workshop.
- To facilitate studies by new groups and individuals we need to make things as easy as possible to generate or access detector designs and MC events.
- Will use the DBD experience as a guide, but will need to further optimize, automate and robustify processes.

Snowmass 2013



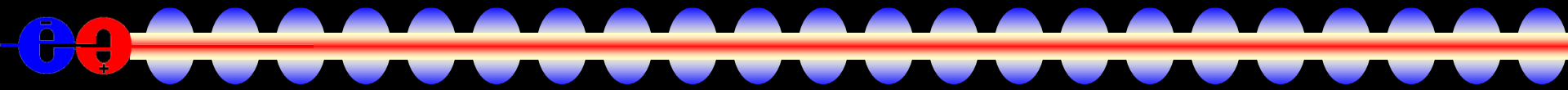
- Will start by thoroughly documenting DBD and related event samples and provide easy access.
  - Can't expect everyone to have Grid credentials or belong to the correct VO.
  - Will provide access to DBD and related event samples via ftp from SLAC nfs disks.
- Hope that benchmark analysis code is released, forming an example for analysis workflow.
  - Would also help ILC community in our next TLA.
- Will work with physics groups to make sure event samples, when generated, have common characteristics (e.g. parton evolution)

Snowmass 2013



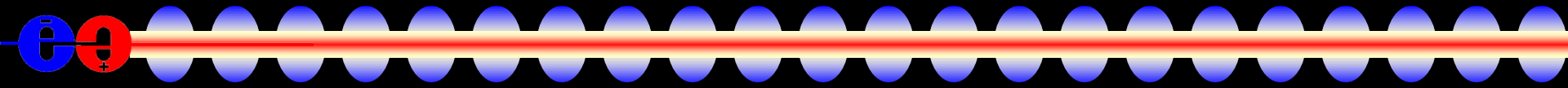
- Will need to document standard MC event generation and make sure it is robust.
- Resurrecting and improving fastMC code and functionality
- Documenting procedures for defining and characterizing new detectors.
- Identifying resources to be used for this exercise

and beyond…



- Techniques developed for SiD @ ILC and CLiC can also be used for Muon Collider studies.
- Some additions to slic and GeomConverter specific to MuC
  - e.g. tapered endcap calorimeters
- Background overlay and timing cut functionality developed and tested at CLiC directly applicable.
- Will support MuC studies leading up to and at the Snowmass 2013 meeting.

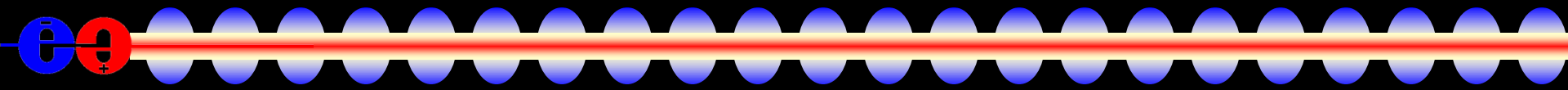
and further beyond…



- Software workshop at CERN identified issues of common concern to the LC community.
- General consensus to work towards a common simulation application
- Work closely with other efforts (e.g. AIDA WP2)
- Activity to begin in earnest after DBD production.

https://indico.cern.ch/conferenceDisplay.py?confId=171897

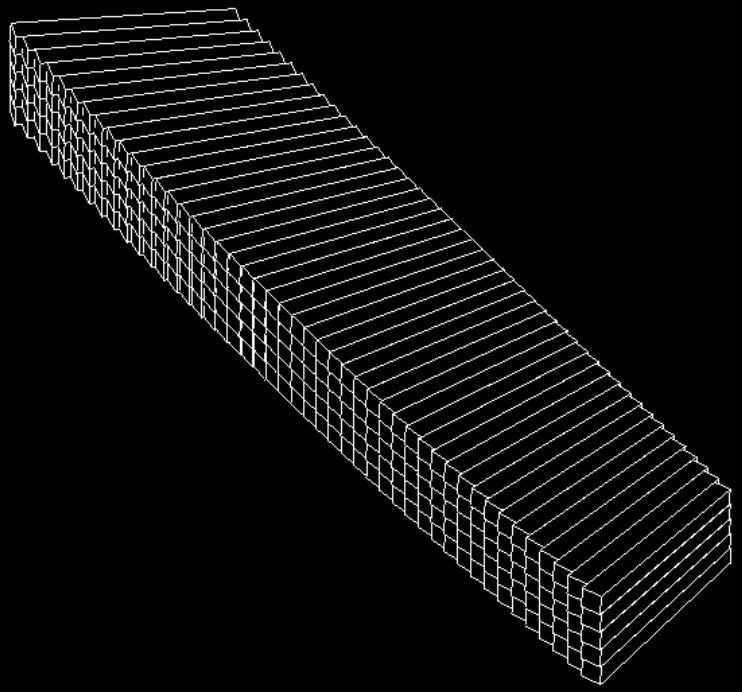
Other users

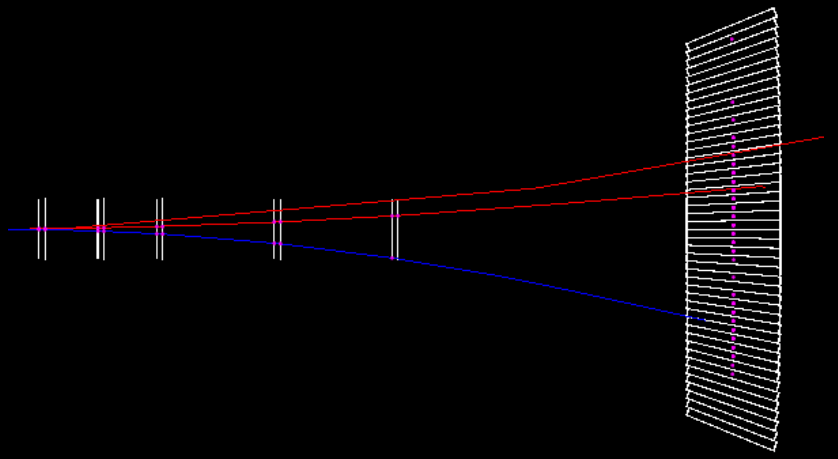


- HPS experiment at Jlab has adopted the lcsim software for its simulation and reconstruction.
- Test run took place earlier this year.
- Real data places different requirements on both the simulation and reconstruction software.
  - Conditions database improved
  - Full 3D field map being implemented
  - Runge-Kutta stepper implemented
  - Alignment code being implemented
  - …

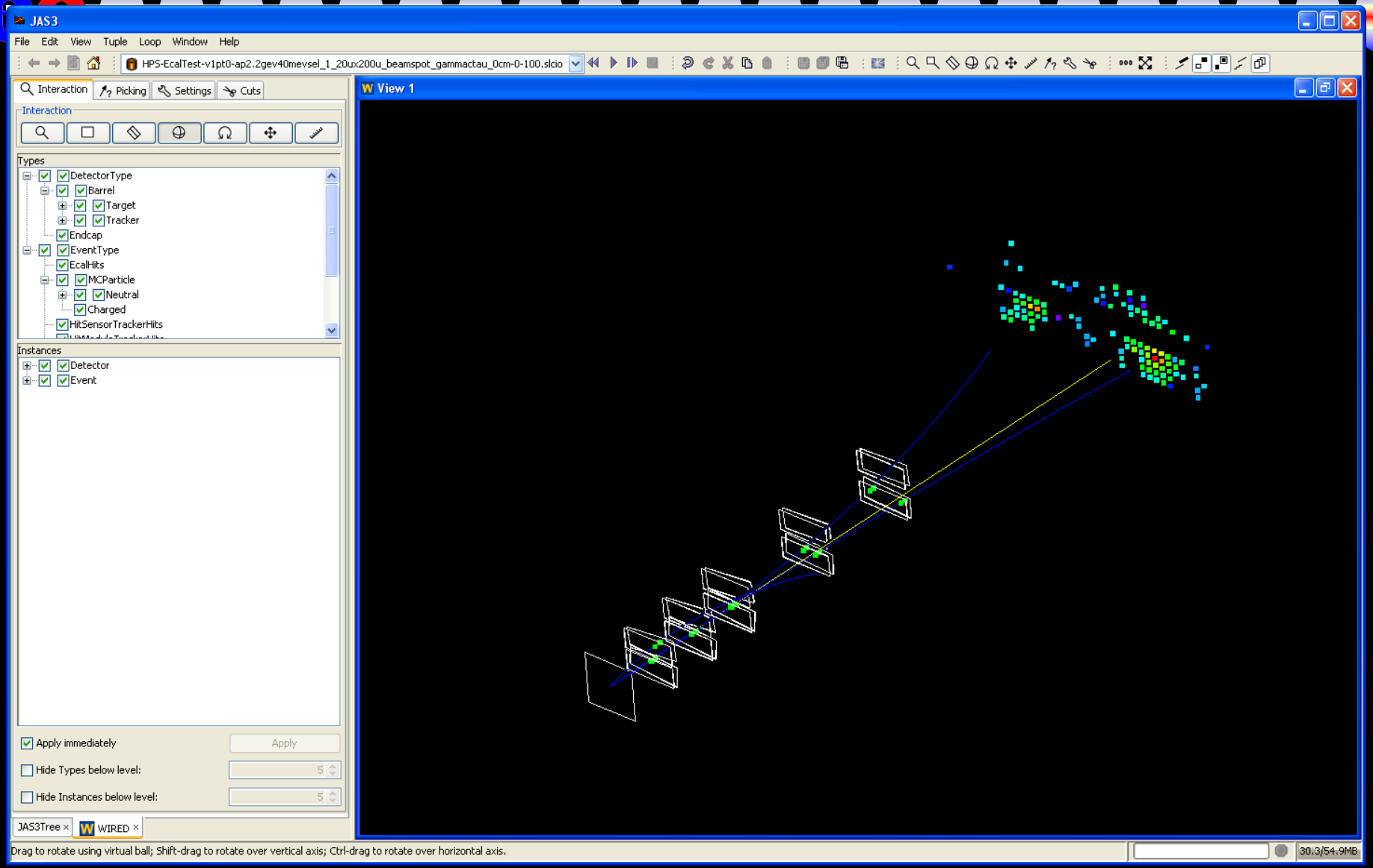
Simulating the HPS ECal

- Crystal array geometry and readout is supported in the compact format.
- Silicon tracker modules individually definable and positionable.





Wired Event Display



mesh2gdml

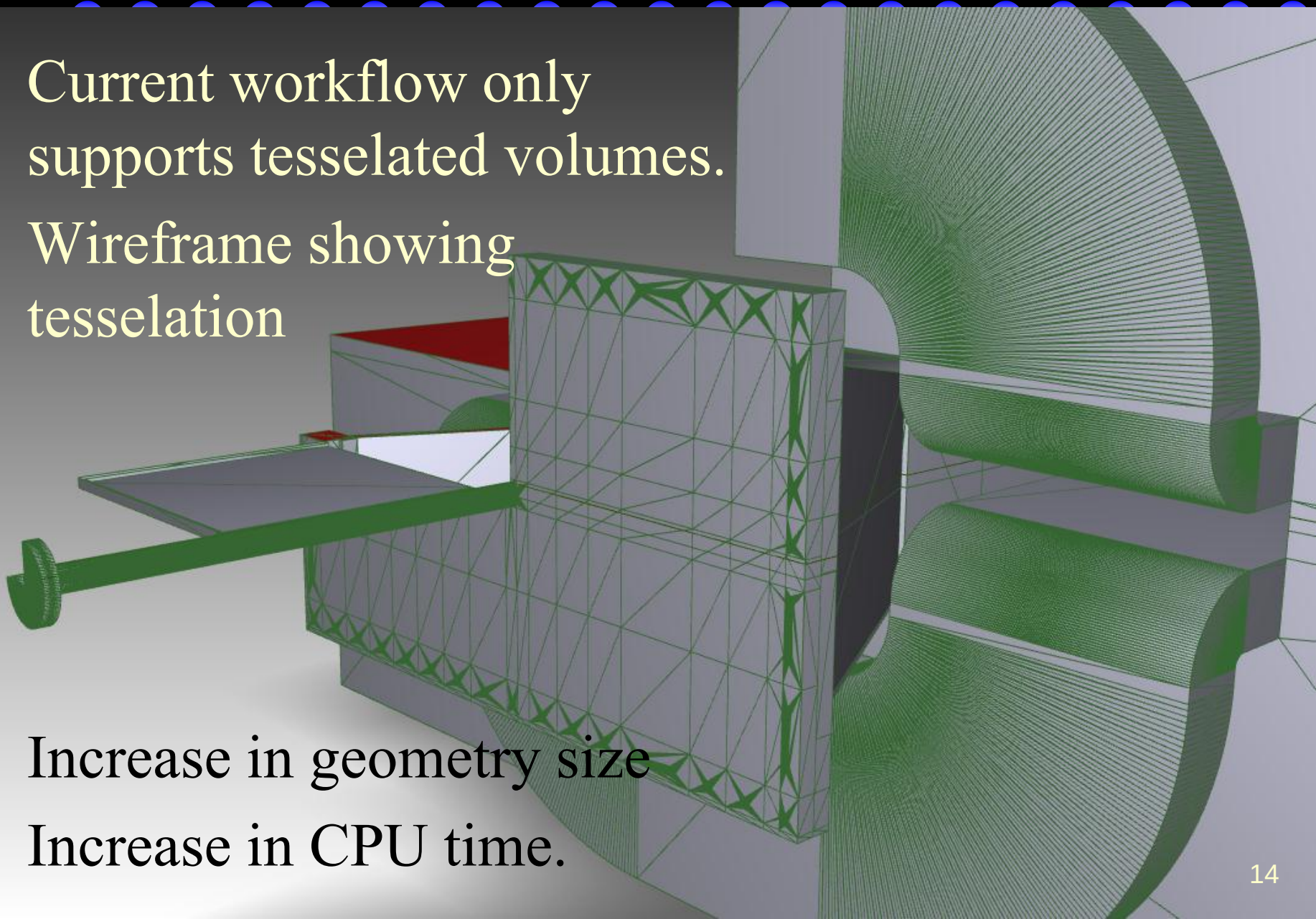
- Convert STL facets directly to G4TriangularFacet and create G4TessellatedSolid.
- Assign material at creation time, e.g.

> java StlToGdml model.stl model.gdml Aluminum

- Can either create world volume from bounding box to use standalone, or leave as individual volume to aggregate or incorporate into a common world volume later.
- Work in progress on GUI to aid translation process, allowing user to select volume and:
  - Delete unwanted volumes
  - Assign material
    - by name (prone to mistake, e.g. Aluminum vs Aluminium)
    - from drop-down list (predefined, e.g. NIST or G4_*)
    - from material editor
  - Create hierarchy and place volumes into it.
  - Associate sensitive detectors? …

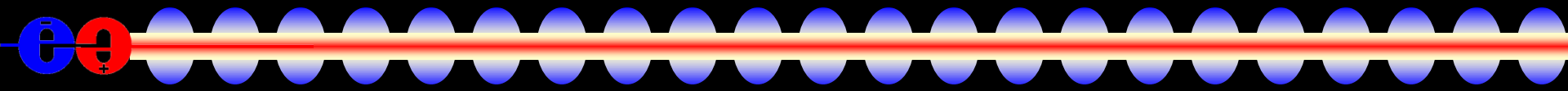
CAD-imported elements.

- Current workflow only supports tesselated volumes.
- Wireframe showing tesselation



- Increase in geometry size
- Increase in CPU time.

Summary



- Large amount of work done to complete the DBD.
  - Benefitted enormously from the CLiC CDR effort
    - Reconstruction of high energy and high background events
    - Automation of Grid submission of jobs
  - Still some work to be completed.
- Next milestone is Snowmass2013
- Code also being used by HPS, focus on real data
- Looking forward to working towards achieving the goals set forth at the CERN common software meeting.
  - Need to plan the next software working meeting