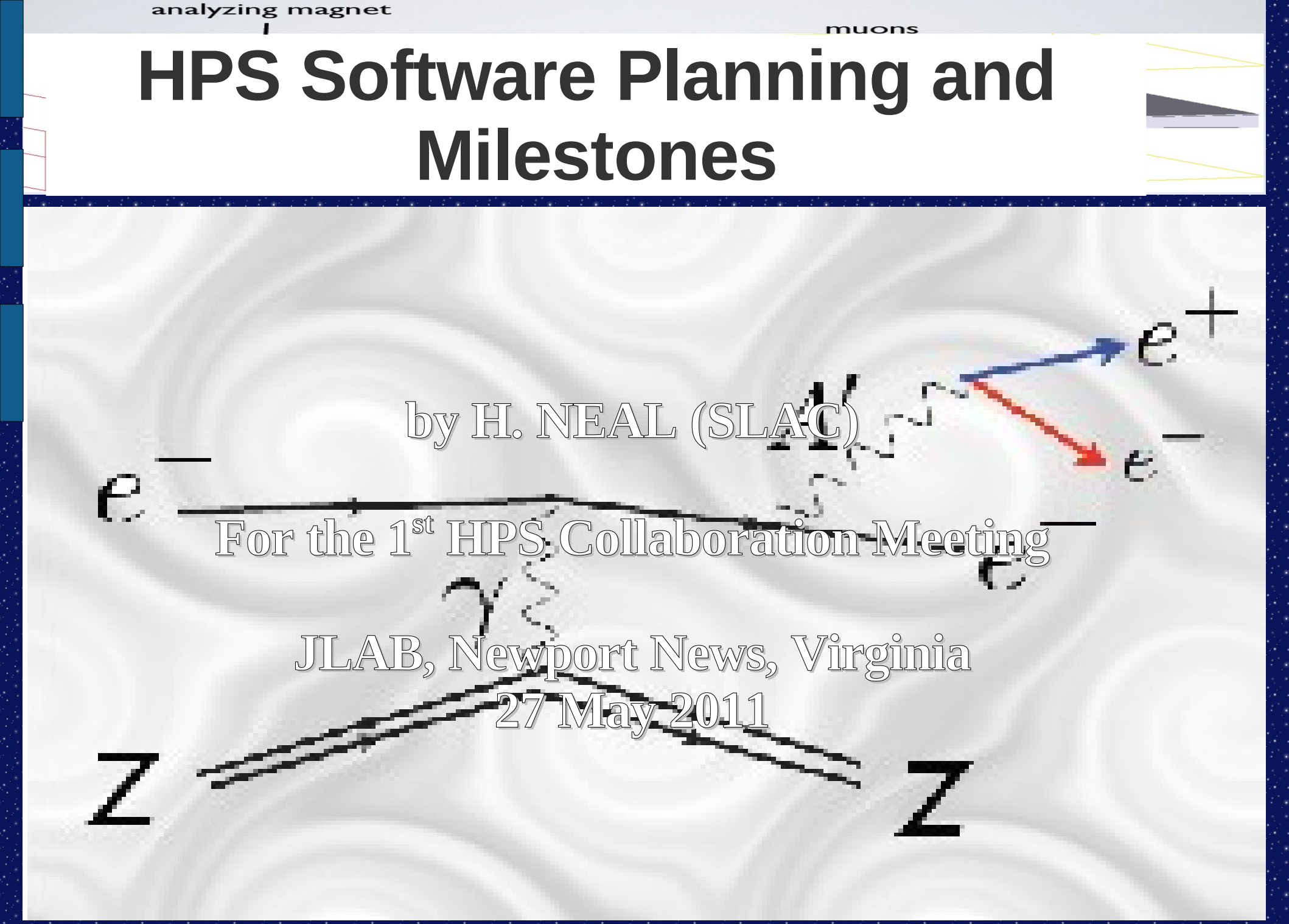


HPS Software Planning and Milestones

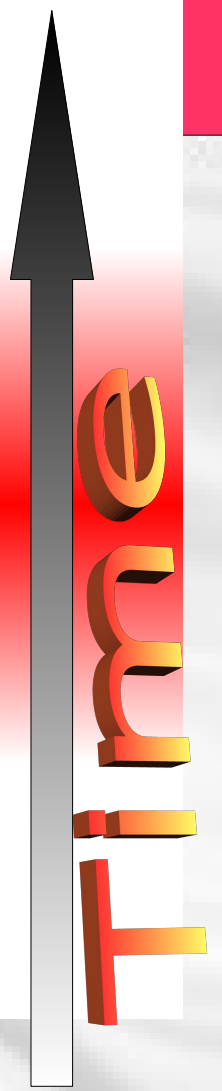
by H. NEAL (SLAC)

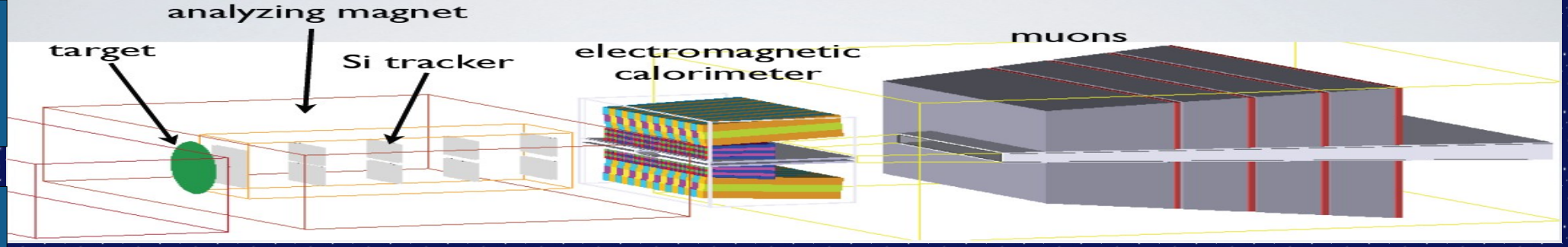
For the 1st HPS Collaboration Meeting

JLAB, Newport News, Virginia
27 May 2011

Boundary Conditions

- First data run – March 2012
- Analysis validation test
- Data quality monitoring tests
- First data processed from real DAQ through full chain
- Test data access tools
- Raw and Processed data onto file server
- Get first processed data out from all systems
- Get simulated raw data into lcsim
- Define event data model

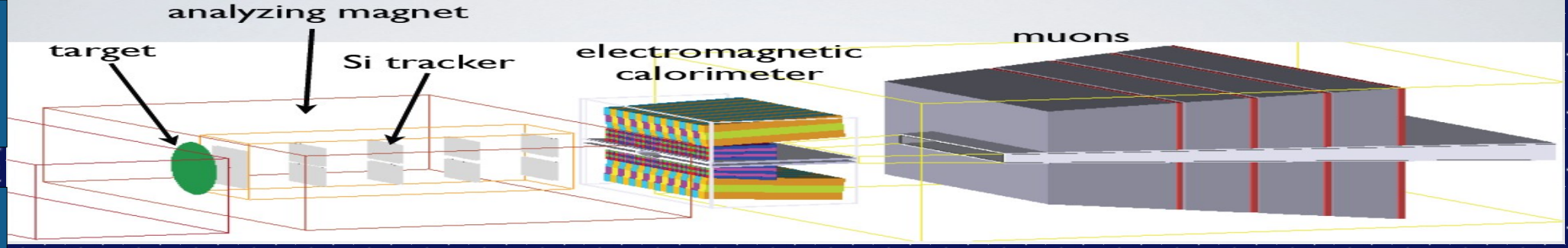




- Event data model
  - What will the data look like?
    - EVIO doesn't care, it is currently used ase carriers of globally labeled blocks of data

SVT EVIO RAW DATA BLOCK	ECAL EVIO RAW DATA BLOCK
What goes here?	What goes here?

- EVIO/LCIO conversion/validation
  - Must have simulated EVIO sample with a well defined data model
- Coordinate conversion
  - Make life easy … don't inforce a choice



ROC

EB

ET

ER

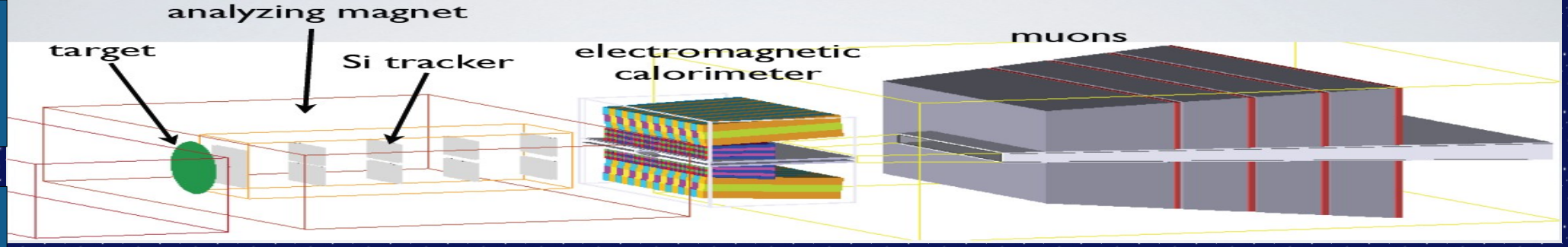
FILESERVER

OFFLINE

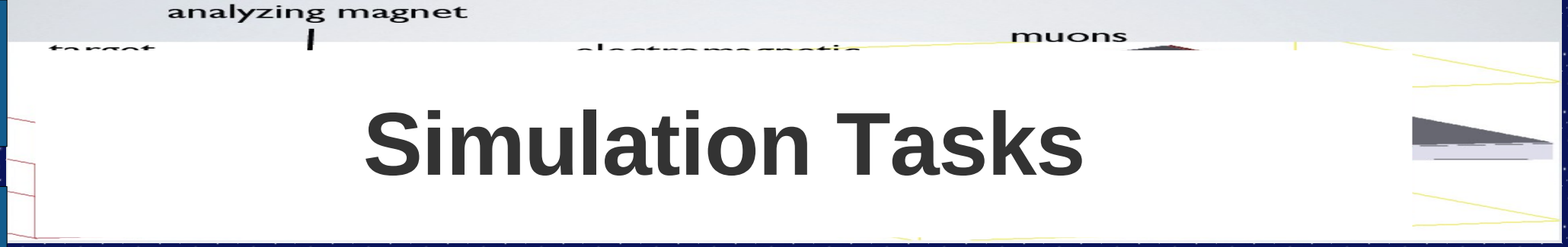
MONITOR-
ING

DATABASES:
conditions...

See Ebrahim's talk



- Full costing for all online/offline needs:
  - Online farm
  - Storage
  - For the test run the needs should be small, but clearly there are possible surprises as we learned this week
  - Do we have all needed ressources at the various sites?



Simulation Tasks

Tools

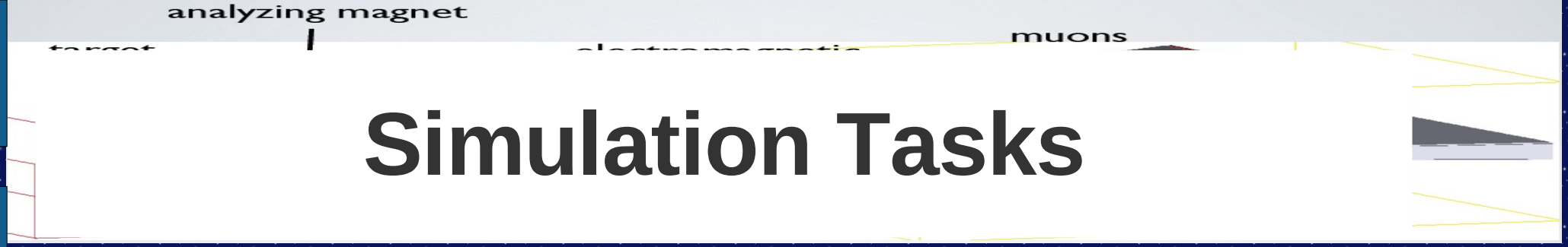
HPS Required Software Components

Added by Maurik Holtrop, last edited by Maurik Holtrop on May 17, 2011 (view change)

Simulation - Event Generators

The background events are currently generated by sending large numbers of electrons through a thin target and having GEANT4 create the background signal. This does not give complete background events, it misses the trident events and a whole lot of low cross section physics. For A' events we have a few input files generated by MadGraph/MadEvent.

Component	Subsystem	Status	Who	Documentation	Comment
G4 Background		buildin			
EGS5 Background	EGS5	complete/ need update	Takashi		Can create background files in txt format.
Tridents		needed	Takashi		
A' Events	MadGraph/MadEvent	complete/need update	Rouven + Matt		



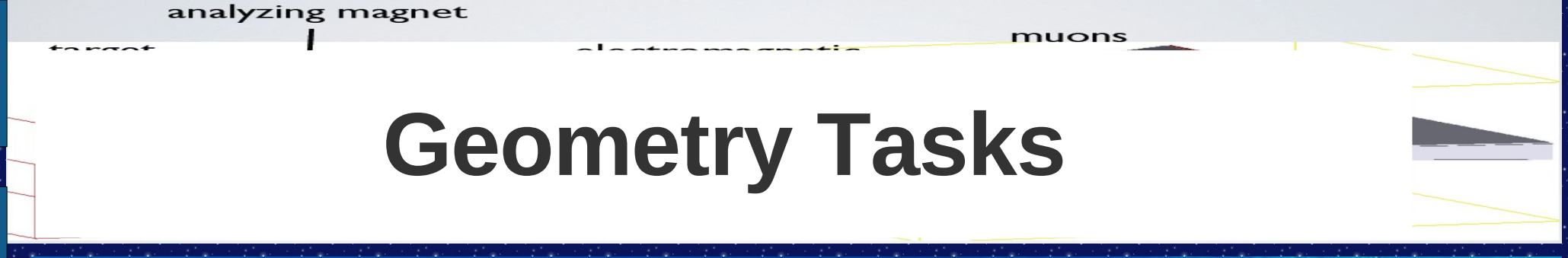
Simulation Tasks

Simulation SLIC

The SLIC simulation framework works well with the tracking code in org.lcsim. This will become the main simulation for MC data production. The code uses the GEANT4 libraries.

SLIC documentation is found at the SLIC Confluence pages.

Component	Subsystem	Status	Who	Documentation	Comment
Geometry	Input type	compact.xml			
	• target	complete/ need update			Location needs changing to reflect electron path through magnets
	• tracker	complete/ need update			Locations need changing
	• ECAL	underway ?~ 1 day	Tim, Jeremy		
	• Ecal Vacuum chamber	underway	Maurik, Jeremy	?	Gemc -> GDML -> SLIC almost functional, need verification.
	• Beam pipes etc	underway	Maurizio, Jeremy	?	…
	Detailed Alignment	needed	Jeremy + (Tim, Norman, Matt)		
Magnetic Fields	Constant field	complete			
	Field Maps	Needed ~ 1 week			
Input/Output	LCIO output	build in			
	EVIO output	needed ~ 1 week			



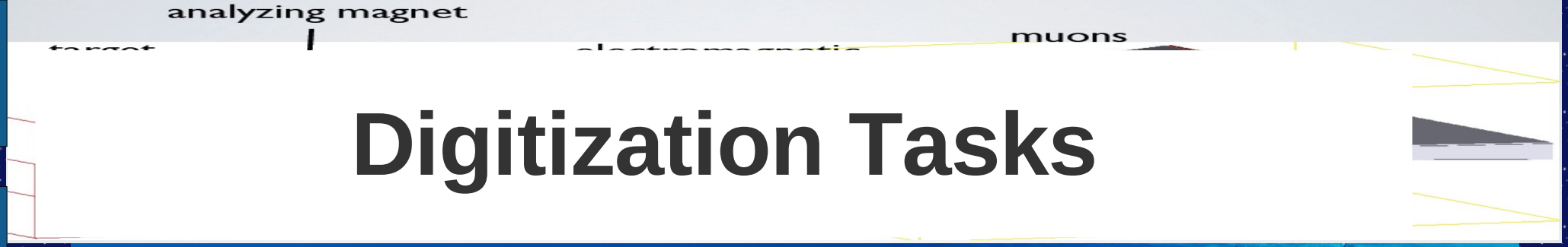
Geometry Tasks

Simulation GEMC

The GEMC simulation framework uses a MySQL database to define geometry. It also uses the GEANT4 libraries to implement the physical processes. It is being used to determine the geometry of the ECAL vacuum chamber and shielding needed to protect the CLAS detector and to determine the background noise due to objects in the hall.

GEMC documentation is found at GEMC Documentation and at the CLAS12 Wiki.

Component	Subsystem	Status	Who	Documentation	Comment
Geometry	Input type	MySQL	Maurizio		
	• target	complete	Maurik		
	• tracker	complete	Maurik		Thickness and material of backing needs to be verified.
	• ECAL	complete	Tim, Jeremy		
	• Ecal Vacuum chamber	underway/compete	Maurik, Phillipe		Nearly final, working with engineers to finalize.
	• Beam pipes etc	underway	Maurizio		
	Detailed Alignment	needed?			
	Input GDML / LCDD files	needed?			
Magnetic Fields	Constant field	complete			
	Field Map	complete			
Input/Output	LCIO output	needed ?~ 2 weeks	Ebrahim		
	EVIO output	buildin			

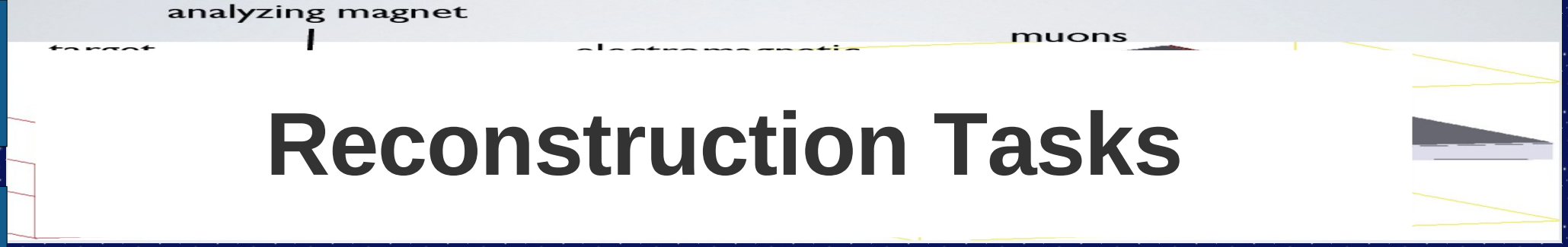


Digitization Tasks

Digitization

The digitization will mostly be done outside of the main simulation package. Tracker digitization is complicated.

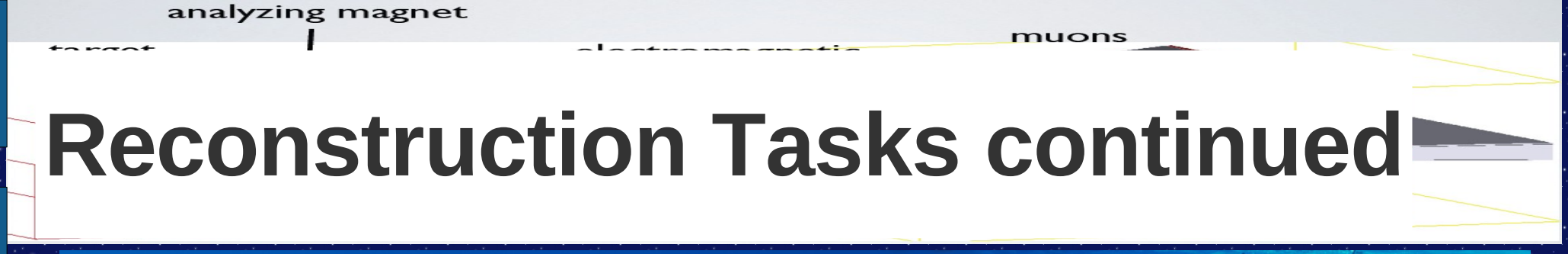
Component	Subsystem	Status	Who	Documentation	Comment
Tracker					
	Charge Deposition	complete			
	APV25 Simulation	complete/ update needed ~ 2 weeks	Tim		Need to add the simulation of multi-peak readout
ECAL					
	Crystal Response	needed ~ 2 weeks	Maurik + Students		Use actual signals to figure out what response is, then model it
	Digitization	needed ~ 2 weeks	Maurik + Students		...
Time Dependence	All	needed ??	Norman + others		We need to have the long term background data in the events. Time scale ~ 100 ns before the event.



Reconstruction Tasks

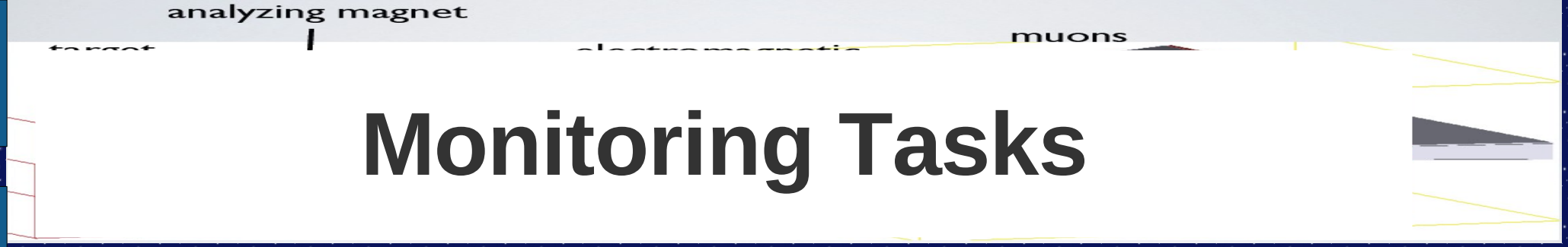
Reconstruction

Component	Subsystem	Status	Who	Documentation	Comment
Event Data Model Conversion		needed. 6 weeks?	Homer + Sergey		
Geometry/Identifier Service		complete/ update needed			Basic geometry comes from compact.xml. Detailed geometry and differential constants need to be implemented.
Tracker Conditions					
• alignment		needed. 2 weeks?			
• bad sensors, chips, channels		needed, but perhaps not at channel level. 2 weeks?			
• pedestals, gains, noise		needed. 2 weeks?			
ECal Conditions					
• alignment?					
• response curves?					
Track Reconstruction					
• material model		complete, generated automatically			
• t0 reconstruction		needed. 8 weeks?			
• track finding		complete.			



Reconstruction Tasks continued

• t0 reconstruction		needed. 8 weeks?			
• track finding		complete.			
• track fitting		complete.			
• Tracking in non uniform field		needed 8 weeks?			
Vertex Reconstruction					
• vertex finding		complete.			
• vertex fitting		complete.			
• vertex constraining tracks		complete.			
ECal Reconstruction					
• clustering		needed. 1 week?			
Trigger					
• Simulation of L1/L2 Trigger		Update needed ?~ 2 weeks.	Maurik		
• Level3 Trigger		needed. 12 weeks?	Omar		



Monitoring Tasks

Monitoring/Online Tools

Component	Subsystem	Status	Who	Documentation	Comment
Event Display	Wired	needs implementation			
	CED	needs implementation	Dave Heddle		
ECal Monitoring					
• Occupancy		needed.	Tim		
• Trigger statistics		needed.	Tim		
Tracker Monitoring					
• Occupancy		needed.	Tim		
• Track Attributes		needed.	Matt		
• Vertex Attributes		needed.	Matt		
Physics Monitoring					
• Key analysis quantities		needed.	Tim + Matt		
Detector Control Systems	Slow Controls	existing/integration needed	Hovanes + Nerses		Uses the EPICS system.
	Scalar readout	existing			Can use existing CLAS systems?
	Magnets	existing			Integration needed.

Calibration/Constants/Analysis Tasks

Calibration

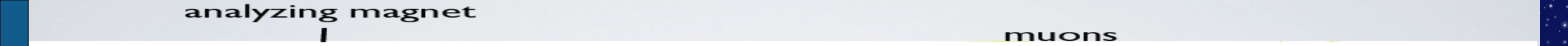
Component	Subsystem	Status	Who	Documentation	Comment
Tracker Alignment	Tracker	needed. 12 weeks?	Matt Graham + Tim		Big job, needs at least 2 people
Tracker Channel Status					
Tracker T0					
ECAL Energy	ECAL		FX, Stepan		
ECAL T0			FX, Stepan		
Trigger Tuning	ECAL				

Constants

Component	Subsystem	Status	Who	Documentation	Comment
Constants Database		needed. 2 weeks?	Homer		
Constants Maintenance	All	continuous			

Physics Analysis

Component	Subsystem	Status	Who	Documentation	Comment
Convertion to ROOT	ROOT	needed. 1 weeks?	Matt Graham		
Conversion to HBook	PAW	needed?			



HPS Test Run Questions that still need to be answered to plan for ressource needs

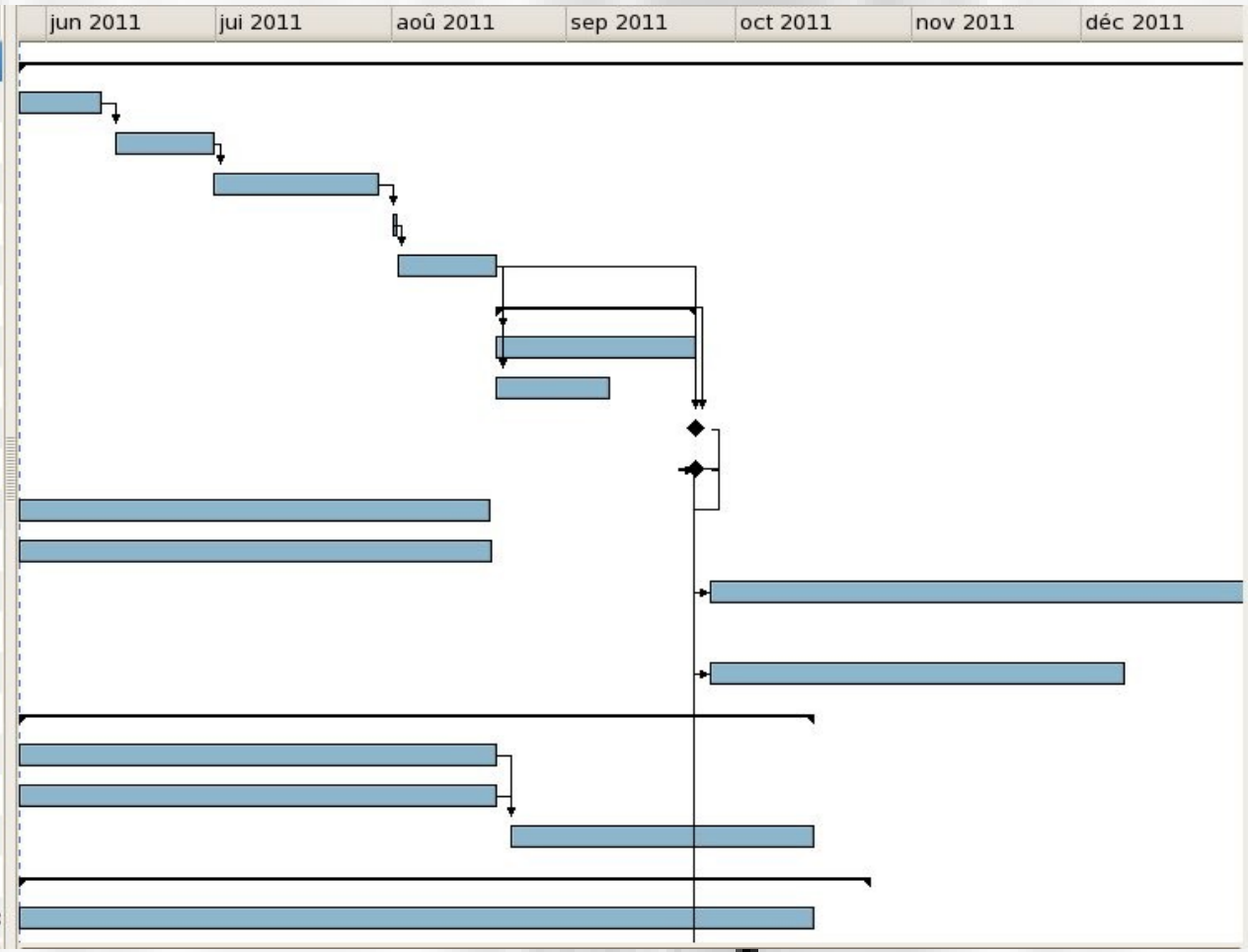
- How many events will be needed to satisfactorily meet these goals?
- Where will the data be stored?
  - Raw (just at JLAB?)
  - Processed/simulated data
    - JLAB (recon only?)
    - UNH and SLAC (both?)
- How will it be accessed?
  - xrootd at SLAC? (note: independent of file format)
- Are there any significant simulation productions needed with these studies?

analyzing magnet

muons

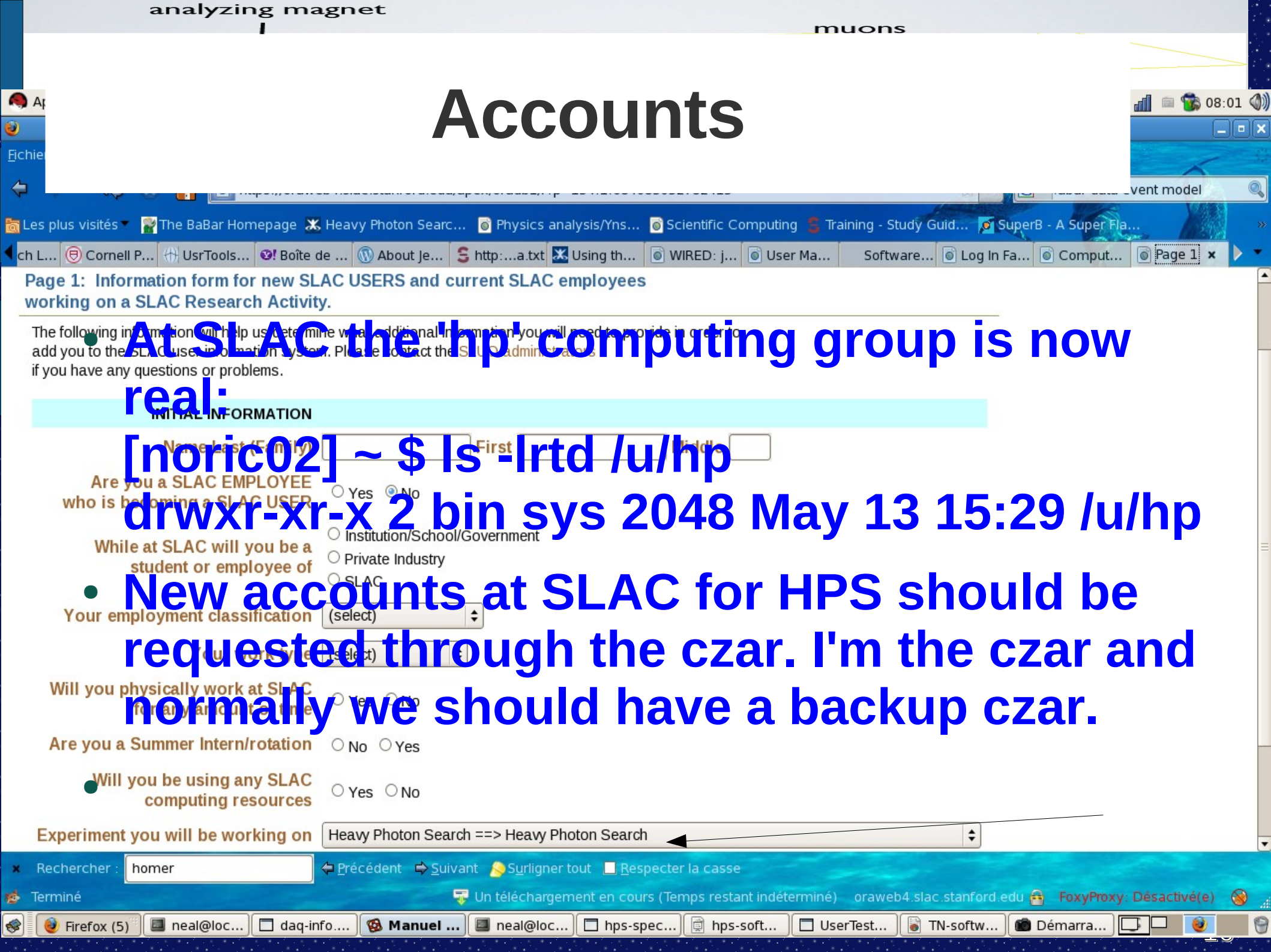
Starting to make an Itinerary

WBS	Nom
1	**ROC to Offline**
1.1	define event data model
1.2	simulate EVIO data out of ROC
1.3	develop interpreter of the raw data
1.4	complete geometry/navigation
1.5	make EVIO<->LCIO converter
1.6	**lcsim reconstruction development**
1.6.1	L3 trigger development
1.6.2	filter development
1.7	full processing of raw data
1.8	multiple processed data on fileserver
1.9	conditions database development
1.10	calibrations
1.11	validation tests
1.12	real data processed and on tape
1.13	production tests
2	**Simulation**
2.1	conditions
2.2	trigger simulation
2.3	production tests
3	**Analysis**
3.1	validate that all needed objects are available in proc



!!!This is just a first attempt and needs many more details and refinements!!!

Accounts



- At SLAC the 'hp' computing group is now real:
  [noric02] ~ $ ls -lrtd /u/hp
  drwxr-xr-x 2 bin sys 2048 May 13 15:29 /u/hp
- New accounts at SLAC for HPS should be requested through the czar. I'm the czar and normally we should have a backup czar.