Status of the Simulation Samples and Production Chain for ILD optimization

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Outline

1 Introduction

2 Signals outside of the SLAC MC sample

3 SM Sample Status

Introduction

- Every Analysis used in the context of the optimization will need a good (fully simulated) sample of the SM
- Hence:
  - Provide the SM sample centrally, if possible simulated (with different detector setups) and reconstructed (up to a default PF?)
  - Provide all information and tools necessary to produce specific signal samples individually with exactly the same setup as the SM sample
- Set up a complete production chain for simulation, digitization, reconstruction including PF on the grid, using databases for the management of the production, grid SE for the storage of the data and web interfaces for the meta data and data search
- With several millions of events, this is an effort not far away from running experiments of the previous generation . . .

Background

- Tim Barklow and Norman Graf in a great effort have produced a 2nd generation of a complete SM sample for 500fb^{-1} at all 4 polarizations
- It has been cleared of the 4f and 6f final states affected by the SM Higgs boson by setting $m_h = 2\,\mathrm{TeV}$
- Fragmentation has been checked several times, also all other open issues from the last presentations
- Only open issue now: re-production of τ final states with TAUOLA
- TAUOLA Whizard interface has been developed and successfully tested for SM events, delivered to Tim
- Files are being downloaded to DESY for start of the production in th enear future

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Check if you want to produce your own signal

- Signals outside of the SM sample have to be produced individually
- The site

  http://confluence.slac.stanford.edu/display/ilc/Standard+Model+Data+Samples

  provides all necessary files to set up Whizard in exactly the same way as done for the SM sample
- The information from

  ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/whizard-src/user.f90

  ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/guinea-pig/ilc_0500_may05_run05_seed06/

  can be used to set the same beam structure for any other generator
- Information from

  ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/a6f/include/ilc_fragment_call.f90

  ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/a6f/include/calc_a1sq_a2sq.f90 can be adapted to set up the fragmentation also for other generators
- The resulting generated events can be made available together with the SM sample at

  http://www-flc.desy.de/simulation/database/

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Simulated and Reconstructed Events: Production

- Start with SM calibration events (Z at 91.2 and 500 GeV, tt at 350 GeV) and single particle samples
- This allows for tests and calibration of the reconstruction while the 'real' physics events are simulated
- Then start physics events simulation
  - First run several 10 000 events of each sample, to give everybody a starting point and to be able to do more debiggung
  - Then run the rest in the rough order of priority given in the table below
  - Priority can still be discussed, of course
- Once a significant number of simulated events is available, and calibration is done, run digitization and reconstruction including Pandora PF

Simulated Events: Production proposal

(Too?) Aggressive proposal for production of physics events:

possible signals or backgrounds:		≈ No. Events
$ee \rightarrow 4f$	50fb-1	5M
$ee \rightarrow 6f$	200fb-1	400k
$ee \rightarrow 2f$	20fb-1	2.5M
$ee \rightarrow hX$	50fb-1	75k
calibration samples:		
light quark 2f at 91.2 GeV	20 000 events	
tt (6f) at 350 GeV	20 000 events	
backgrounds:		
$\gamma\gamma \rightarrow X$	0.1fb-1	1M
$ee \rightarrow \gamma\gamma(n * \gamma)$	10fb-1	0.5M
$\nu\nu(n * \gamma)$	20fb-1	1.5M
$ee \rightarrow ee$	0.1fb-1	0.2M
$e\gamma \rightarrow e\gamma$	0.1fb-1	0.6M
rest	1fb-1	0.6M

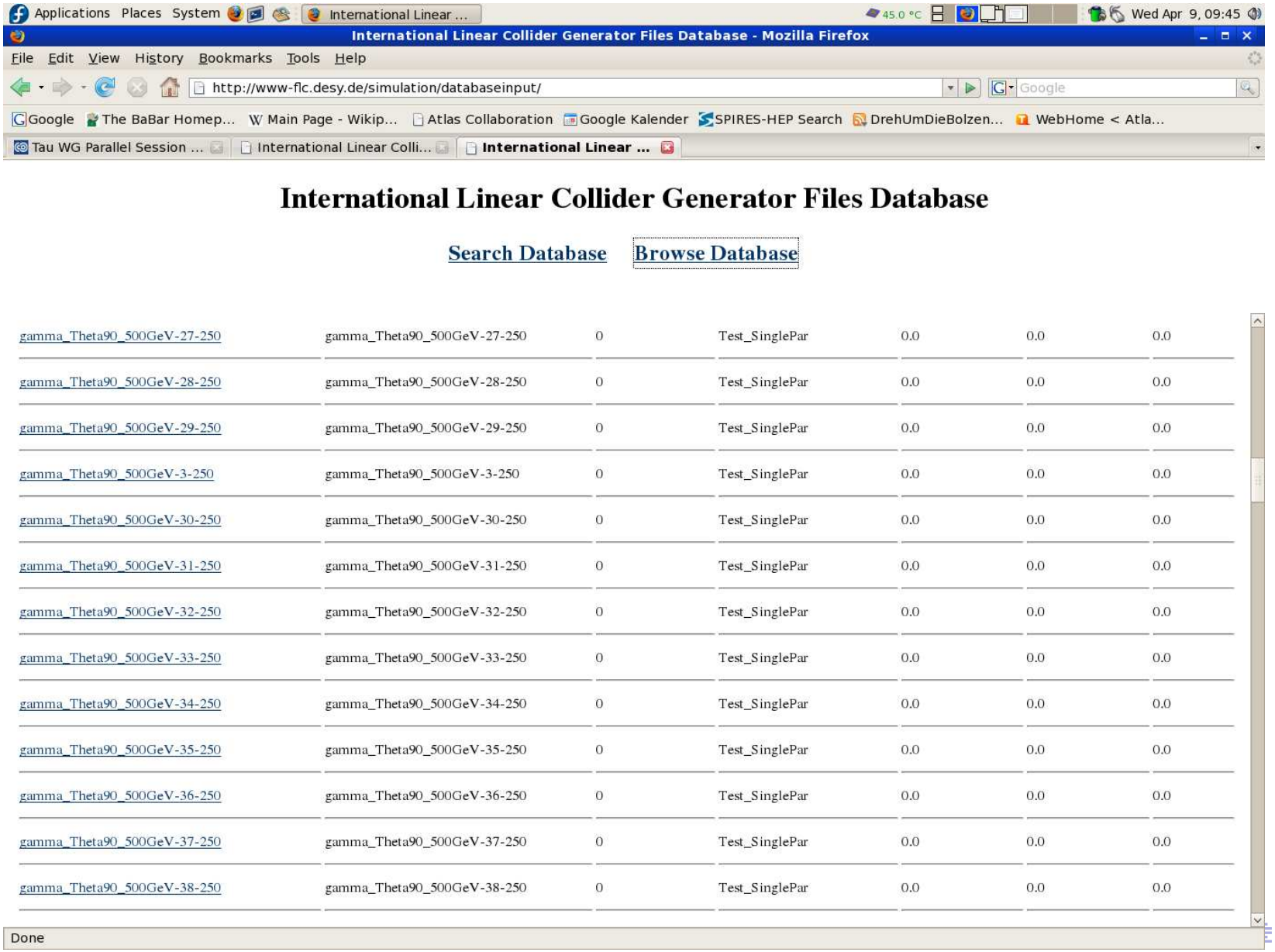
Some thoughts on the use of this for optimization

- The luminosity goal on the previous slide is somewhat agressive for one detector
- It is most probably too agressive for optimization
- My personal recommendations:
  - Produce as much as possible of the background mentioned above for one detector model
  - Start analyses on that set
  - Determine exact needs for specific backgrounds for each important optimization analysis
  - Do one dimensional scan (e.g. fixed coil energy content) with a background set tailored to analyses
  - In the minimum of the 1D scan, do 2D/3D scan

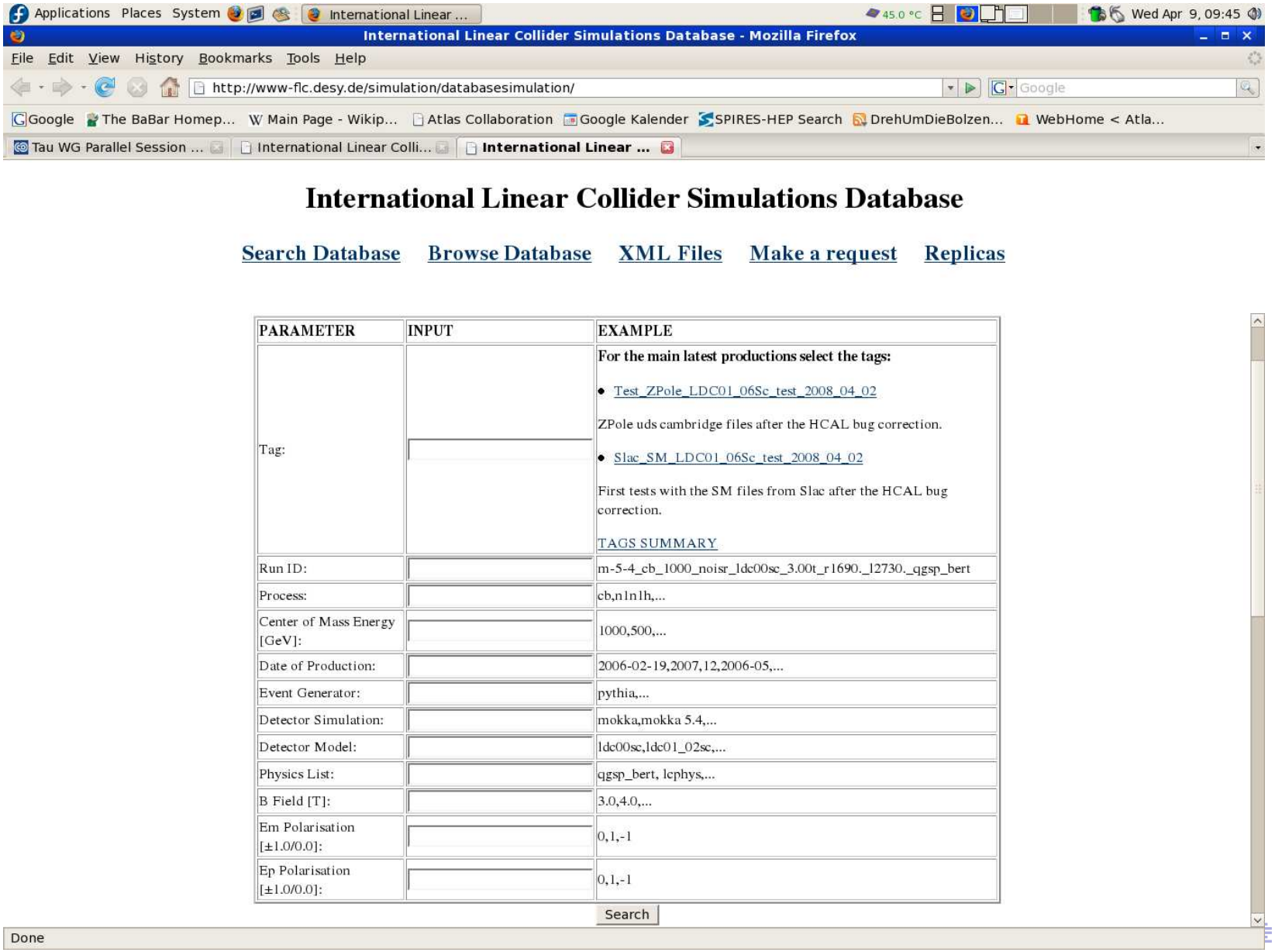
Simulated Events: Availability

- Entry point for the production:
  http://www-flc.desy.de/simulation/database/
- An automatic replica system is being set up, storing files not only at DESY but, if possible, also in Japan and in Northe America
- System has been exercised with several test productions
- On the following slides, you can see the interface

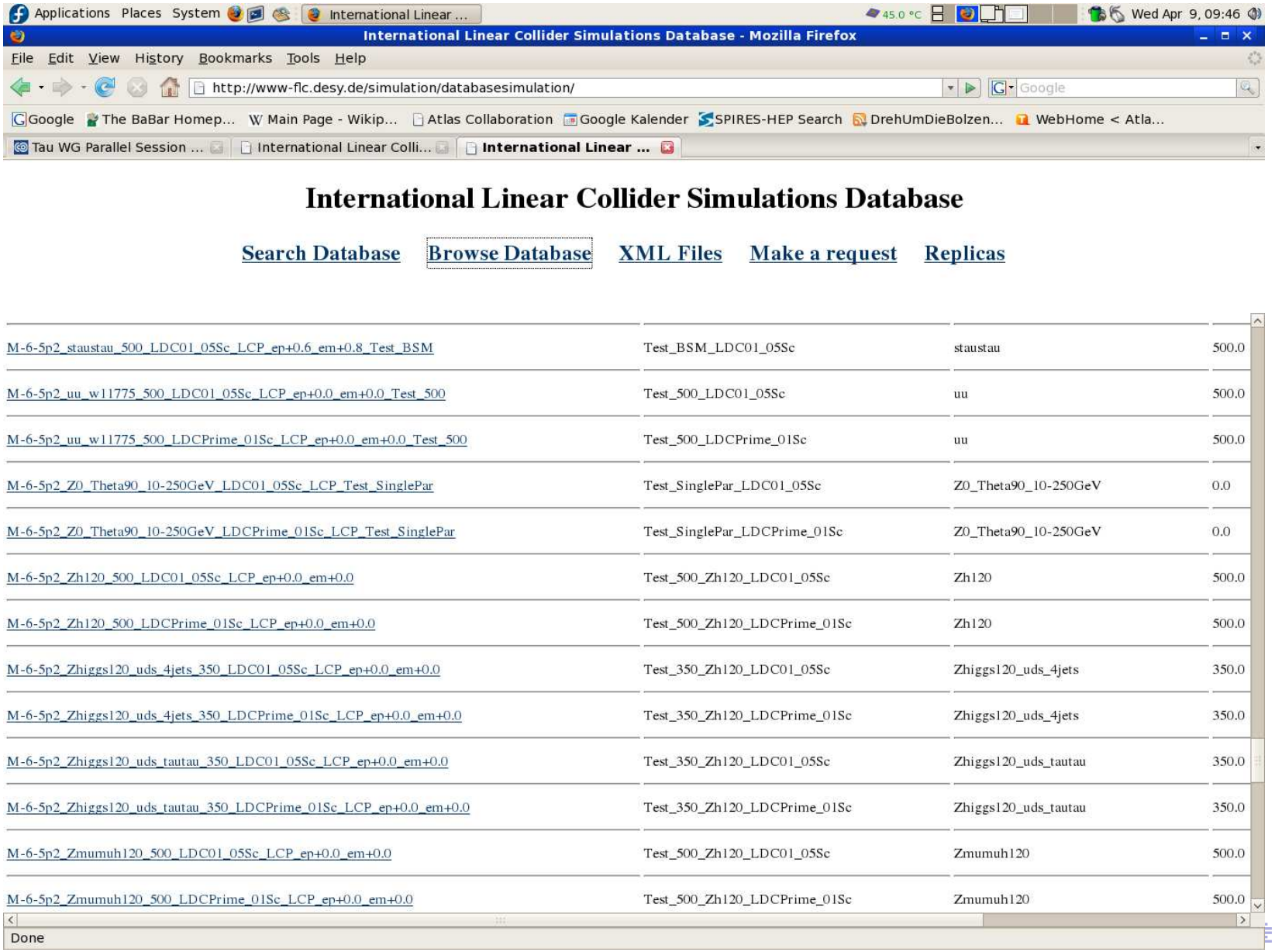
Simulated Events: Generator Files



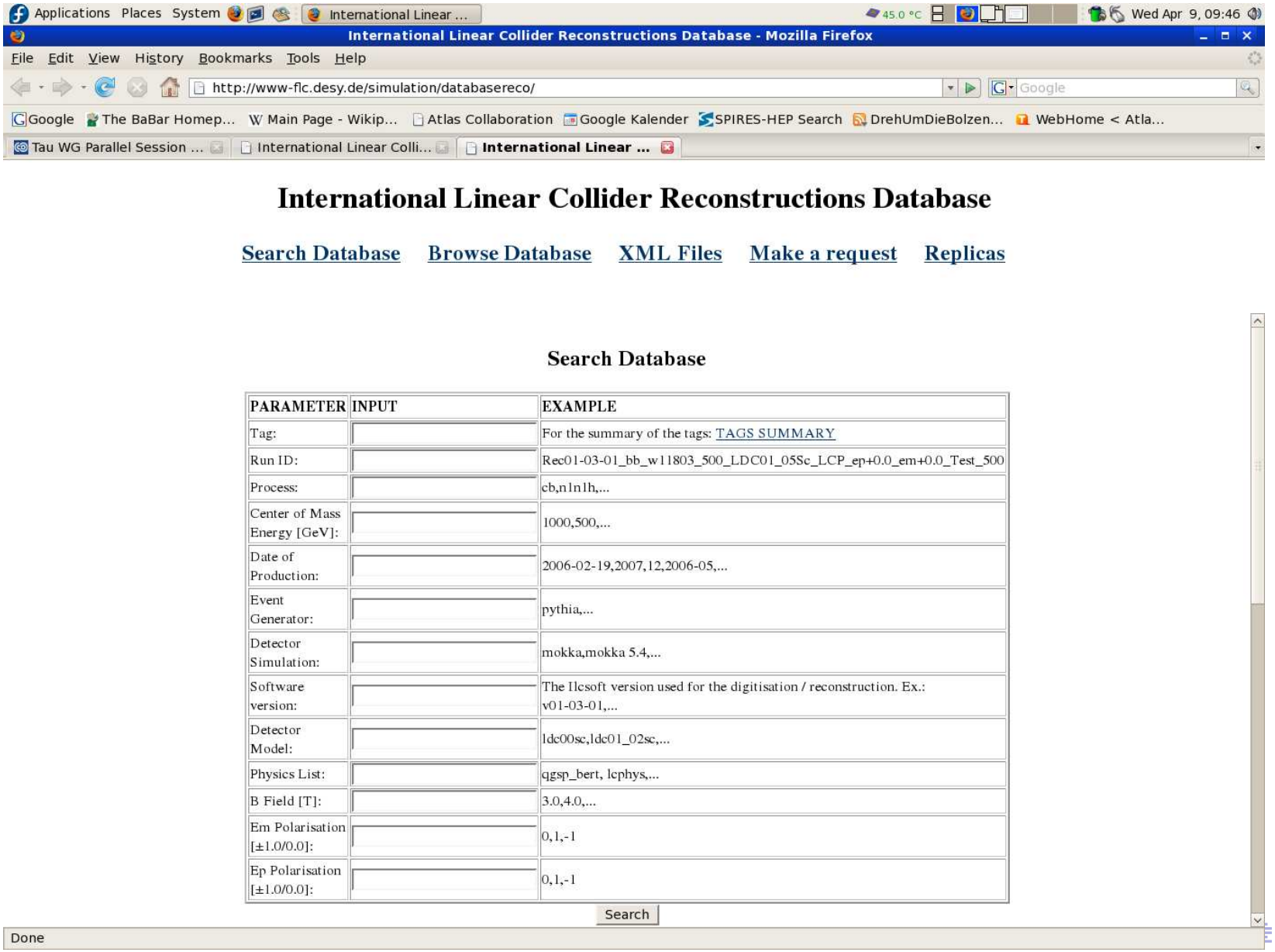
Simulated Events: Search for simulated events



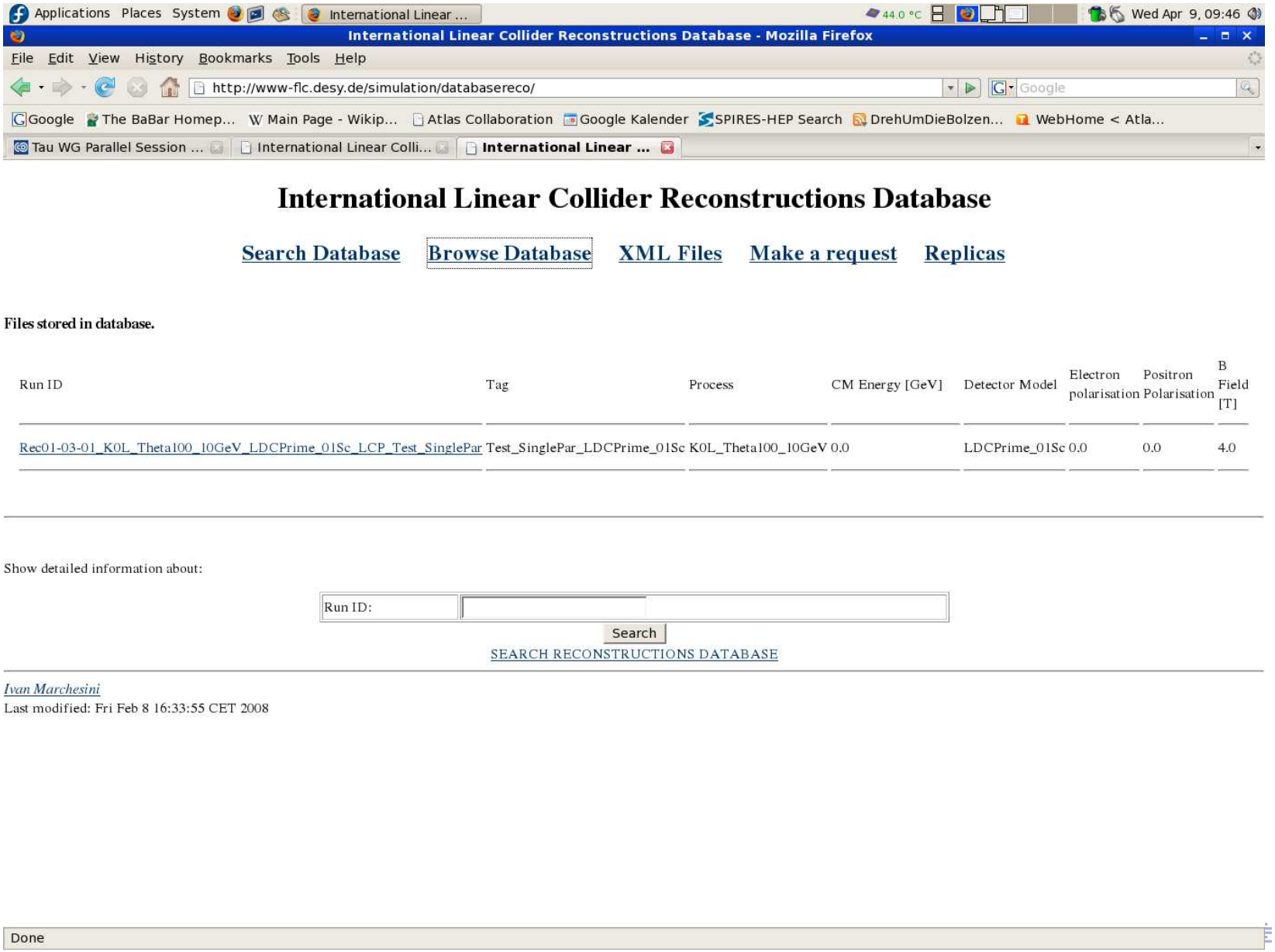
Simulated Events: Find simulated events



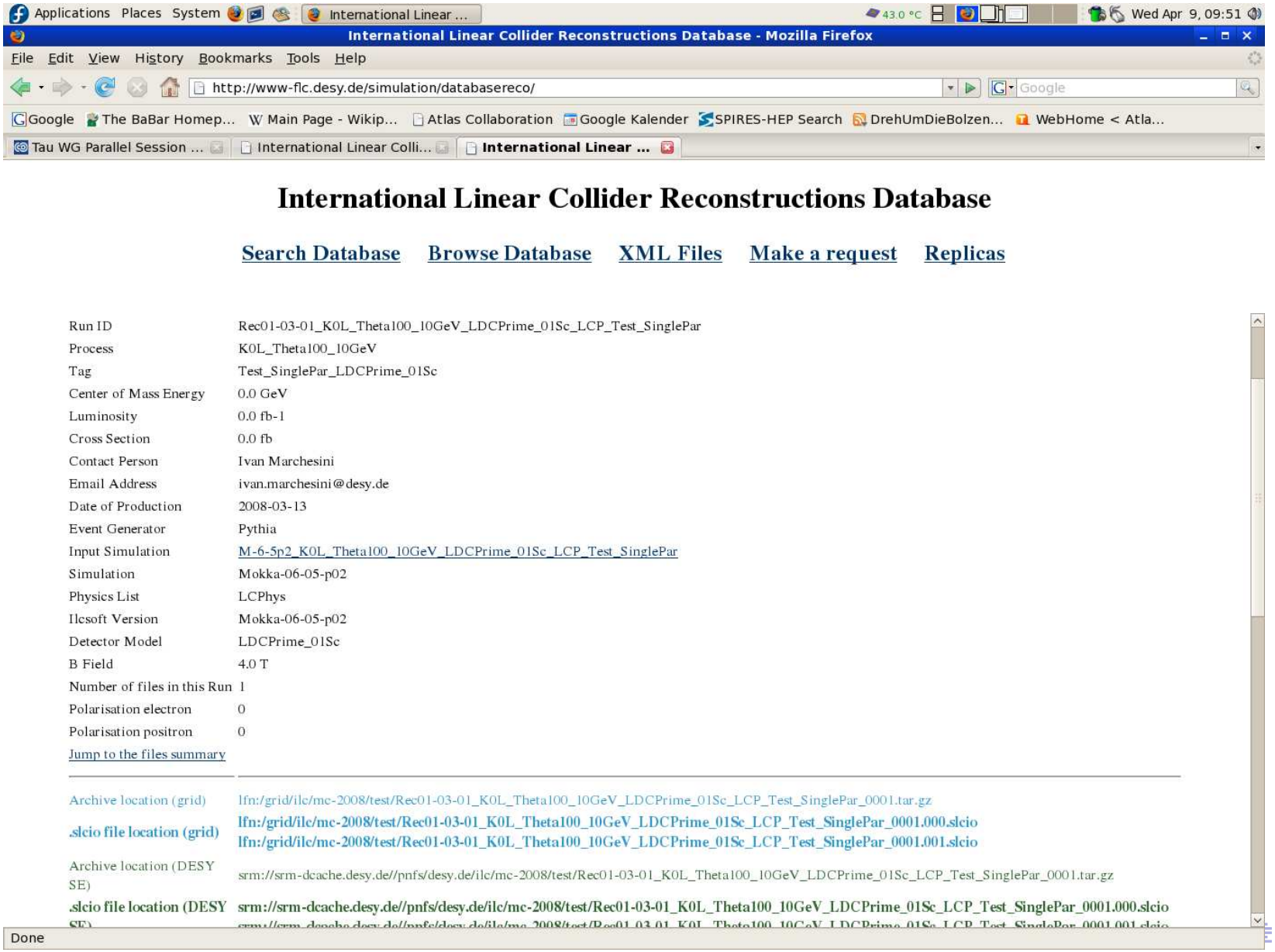
Simulated Events: Search for reconstructed events



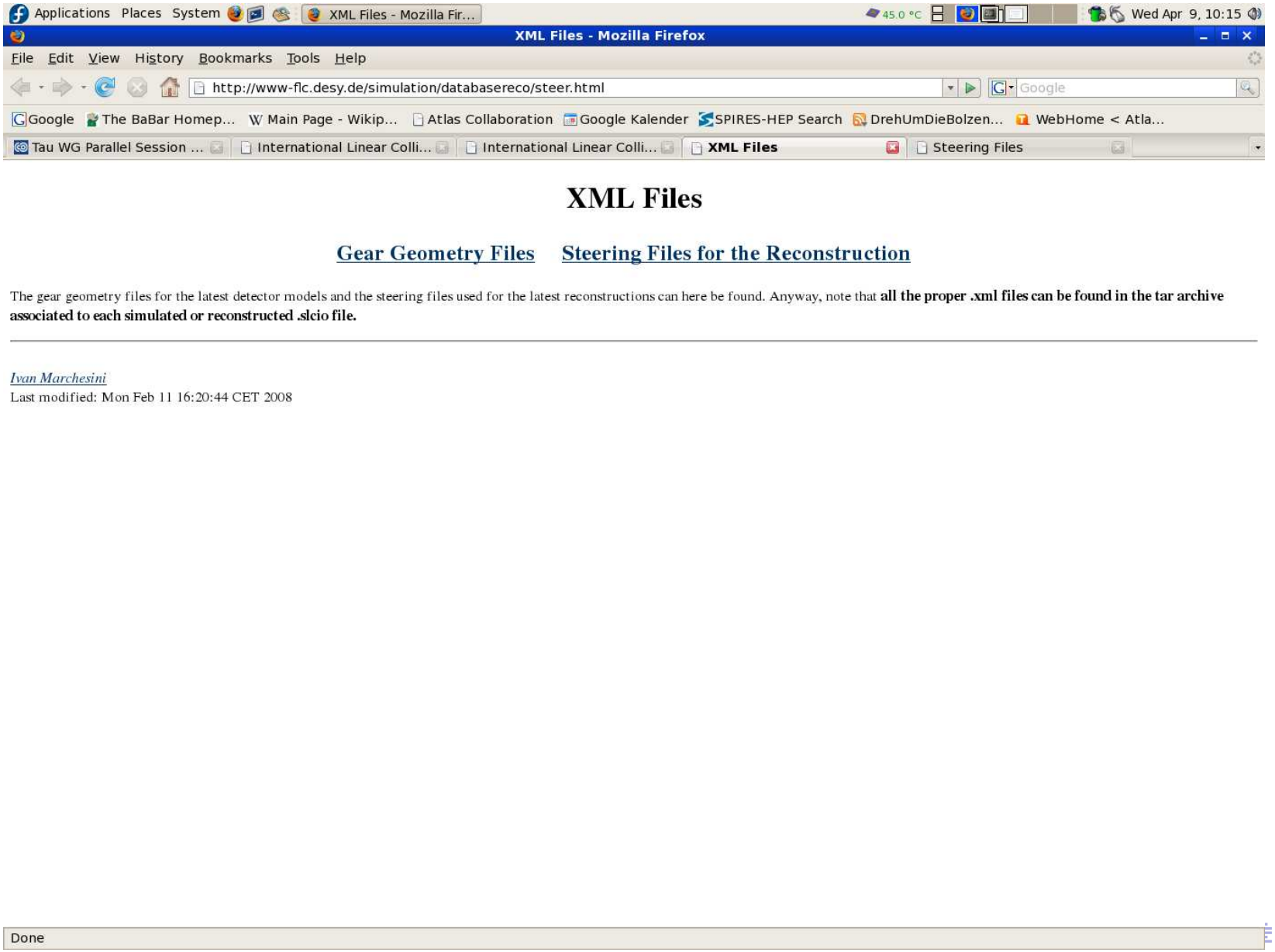
Simulated Events: Find reconstructed events



Simulated Events: Full info on reconstructed events



Simulated Events: Additional Information



Summary

- Production chain on the grid is ready
- Interfaces for worldwide use available
- Generator files mostly copied to Grid SE at DESY
- Open issues:
  - Software completely ready?
  - Detector model?
  - τ final states will stiull have to wait a bit
  - Requests for change in number of events and priority?