

KLOE Offline Status Report

- Data Reconstruction
- MonteCarlo updates
- MonteCarlo production
- Computing Farm

Data Reconstruction

- Same level of reconstruction quality for the entire data set
2001 and 2002 data - $160 \text{ pb}^{-1} + 318 \text{ pb}^{-1}$
70 TB on tape – 80000 files X 5 streams
- The KLOE Reconstruction improved with the results of the charged kaon study : tuned tracking released
dE/dx reconstruction from DC ADCs introduced
- DSTs produced for the entire data set – Data divided into

charged kaon	2 TB total
neutral kaon	1.4 TB total
radiative (neutral)	140 GB total
radiative (charged)	690 GB total
rho-pion (70 pb^{-1} available)	70 GB total

The DSTs can be kept on disk for fast access of the analyses

MonteCarlo

- Great effort to review and upgrade data simulation
- People from K^0 analysis → MonteCarlo

Motivations:

A better simulation important to :

- attain a 0.1% error on **Ks** → $\pi^0\pi^0 / \pi^+\pi^-$
- measure rare **Ks** decays
- improve the description of the response /resolution for Kinematic Fits

Four major tasks :

- selection of Machine background events
- insertion of Machine background events in MC data
- study of data-MC discrepancies
- adjustment of MC simulation

Detector Simulation

- Drift Chamber and Calorimeter geometry revised.
- Wire sagittae revised taking into account all the measurements done (1998,2000,2003)
- Calorimeter Sampling Fraction and Fiber Time Response revised to closely match real data

Detector Response Simulation - Calorimeter

- The photons from $\pi^+\pi^-\pi^0$ have been studied to obtain a more realistic parameterization of the calorimeter sampling fraction
energy response and resolution
time response and resolution
angle dependence of energy and time responses
- On the basis of the pre-production sample the results
 $X_0 = 1.2 \text{ cm}$ $\Delta E/E = 6\%/\sqrt{E(\text{GeV})}$
 $\Delta T = (54/\sqrt{E(\text{GeV})} \oplus 140) \text{ ps}$
are in good agreement with real data.

Detector Response Simulation

- The geometric efficiency related to the inter-module sections of the calorimeter is now simulated by properly discarding hits on the module edges
- Measured variations in the attenuation lengths of the fibers in the end-caps are taken now into account by **clufixene** module.
- The simulation of the wire sagittae has been tested on bhabha events, comparing azimuthal dependence of the reconstructed momenta for real and MonteCarlo data. The agreement is good for both, the electron and the positron distributions.
- The time-to-space relations in the MonteCarlo have been updated to take into account of the new wire sagittae.

Physic Process Generators

- New generator of the Initial State Radiation including treatment of the dependence on the Φ decay channel.
- $Kl \rightarrow Ks$ regeneration revised (Aluminum treated, nucleus recoil, angular distributions modified)
- $\omega\pi^0$, $\eta\gamma$, $f_0\gamma$, $a_0\gamma$ generators changed –
 a_0 and f_0 spectra according to the models used to fit KLOE 2000 data
- A new MC generator for $Ks/Kl \rightarrow \pi^+\pi^-(\gamma)$ without any photon energy cutoff has been written

MonteCarlo Production

- Final goal :

Simulation of a sample corresponding to

100 pb ⁻¹ of Φ decays AND	8.2 TB total + 1.8 TB DSTs
400 pb ⁻¹ of neutral kaon events	11.0 TB total + 2 TB DSTs

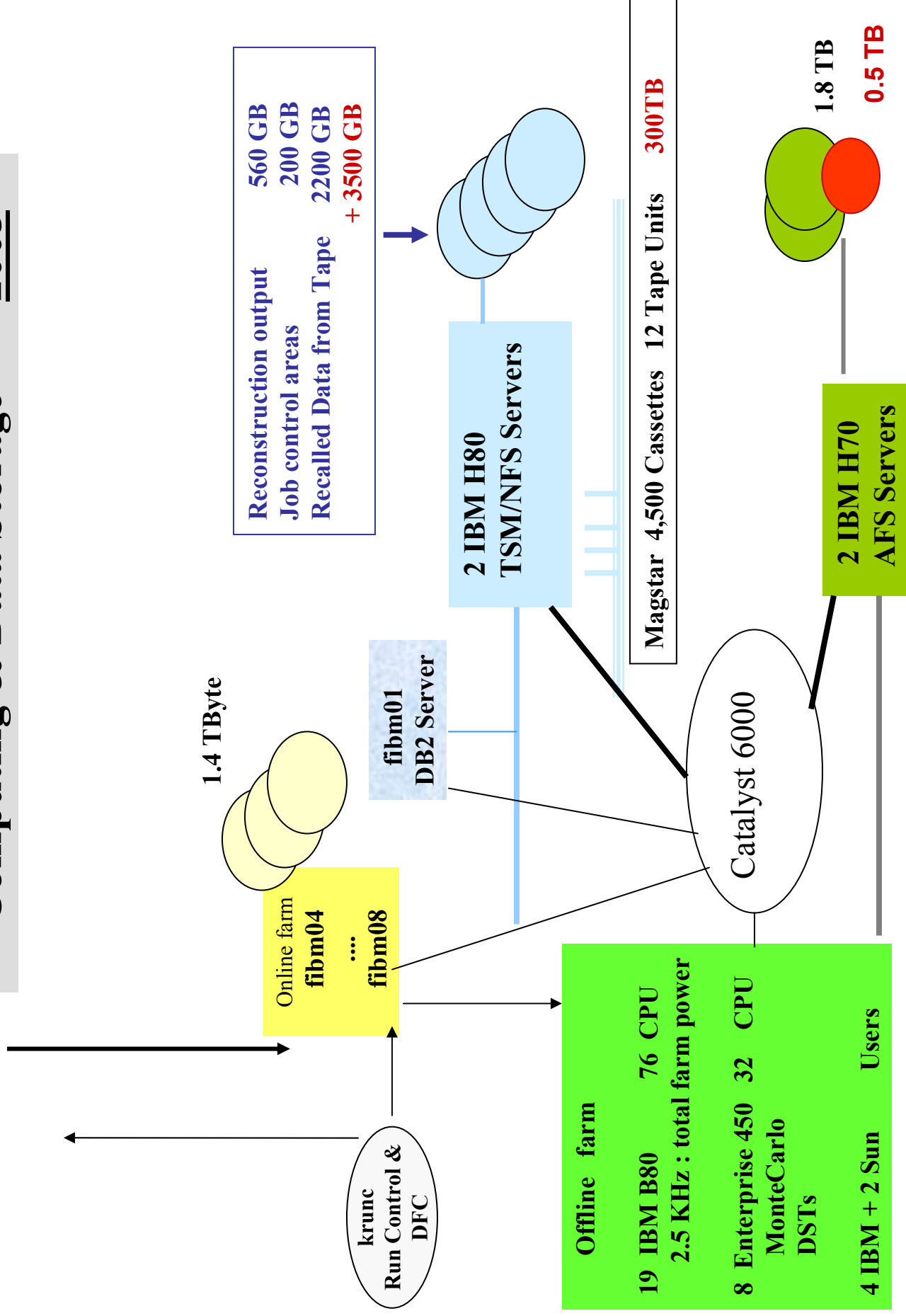
including the machine-background collected in the real data taking.

B80-CPU time 0.4 s/ event generation + reconstruction
→ 60 days running on 60 CPUs / 0.8 → 80 solar days

- The machine-background is extracted directly from data, run by run, analyzing $\gamma\gamma$ events and registering both, the hits in the Drift Chamber and in the Calorimeter.

Machine Background simulation

- The analysis of $\gamma\gamma$ events has been completed for the entire data set.
- The results are on tape (bgg stream) - 77,000 small files – 8 GB total
- The data base organization has been changed to store all the new infos related to the dependence of the MonteCarlo samples from real data
- New software, including A_C modules, DB2 interface programs, the procedures for the job submission is being tested.
Few millions of Φ decays are now available to control data quality.
- Within two weeks we will start the production lasting ~3 months



Computing Farm

- New disks installed – Fiber Channel Technology introduced (4.0 TB)
Disks currently used to store DSTs
AFS space increased also by 0.5 TB (2.3 TB total)
- Database Server – Upgraded (2 GB RAM)
- New Magstar Tape Drives allow to increase the cassette capacity by 50%
40 GB → 60 GB native capacity
Overall tape space increased from 200 TB to 300 TB
- 4000 cassettes have been read and re-written at new density
- The third KLOE computing tender sent out
CPU power AND disk space will be doubled
New hardware available in September

Computing Farm

- Decision for the new Library by the end of the year
- IBM released information about the availability of a new Magstar technology with a roadmap towards 1 TB/cartridge.

First implementation : 300 GB/cassette – native capacity
Time frame 4Q03 –

New Library will be placed in the LNF computer center and remotely attached to the KLOE Servers

First installation: up to 4000 cartridges (1.2 PB)

6 drives (40 MB/s each)

FiberChannel attached drives require the deployment of a Storage Area Network (SAN).

Conclusions

- The KLOE Reconstruction improved with the results of the charged kaon study : tuned tracking released
 - dE/dx reconstruction from DC ADCs introduced
- Same level of reconstruction quality for the entire data set of 480 pb^{-1}
- The DSTs for analyses available on disk
- Great effort to review and upgrade data simulation
- A Monte Carlo production of $O(10^9)$ events (3 months) just started
- The Computing Farm CPU power and disk space will be doubled (Tender in progress)
- Decision for the new Library by the end of the year

KLOE data taking conditions and CPUs for data processing

year	trigger rate, Hz	luminosity $10^{31} \text{ cm}^{-2} \text{ s}^{-1}$	$\phi + \text{Bhabha}$ Rate, Hz	data taking DAQ hours/pb $^{-1}$	data recon. hours*CPU/pb $^{-1}$	total Gb/pb $^{-1}$
2000	2100	0.9	77	33	970	1500
2001	2000	2.4	220	11	520	470
2002	1600	4.1	375	6.8	230	210
2003	2150	10.0	920	2.7	190	145



extrapolated assuming 2002 background and trigger conditions

CPU power for data processing and MC generation

1 fb⁻¹	reprocessing from raw data	reprocessing from streamed data	MC ϕ decay
day CPU	9600	kpm 1440 ksl 1142 rad 198 bha 1440 4220	simulation 6650 reconstruction 5100 11750

data volume for data and MC samples

1 fb⁻¹	raw data	reconstructed	DSTs	MC files	MC DSTs
	115 TB	90 TB	10 TB	82 TB	18 TB

- using 2002 background and trigger conditions
- all numbers refer to a sample of **1 fb⁻¹**
- day CPU number are in units of B80 CPUs