GlueX Software

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Overview

- Simulation
- Data Model / Analysis Framework
- Data Flow / Data Management
- Software Development
- Near-term tasks

Parametric Simulation

HDFast - based on Fermilab's MCFast

- Specify detector geometry with material definitions

- Read in list of generated events

- Generates swims tracks through geometry

- Hits used to build covariance matrix based on detector resolutions.

- Result is track parameters similar to what one would get from full track reconstruction
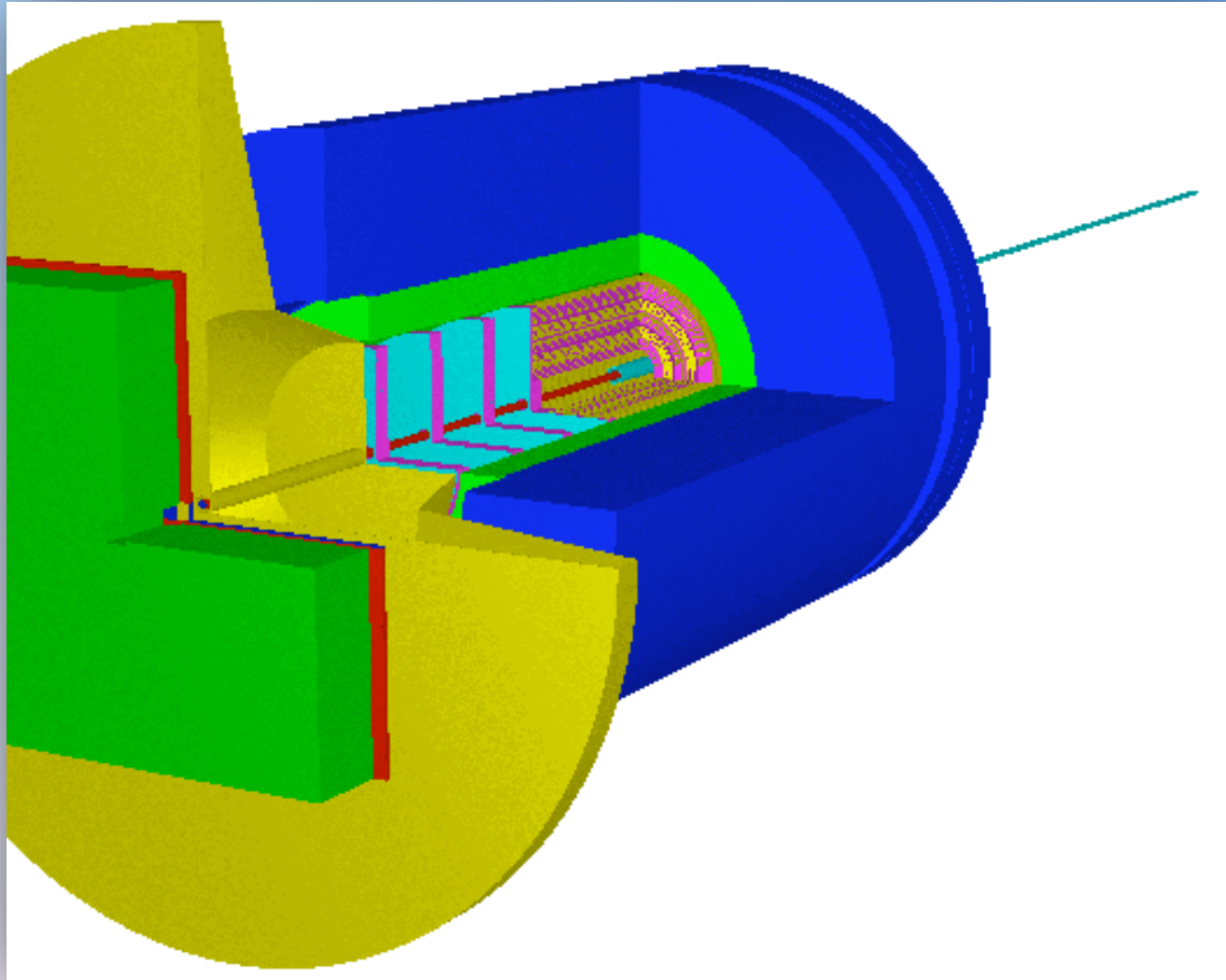
Hall D
Meson Spectrometer
Stage 1
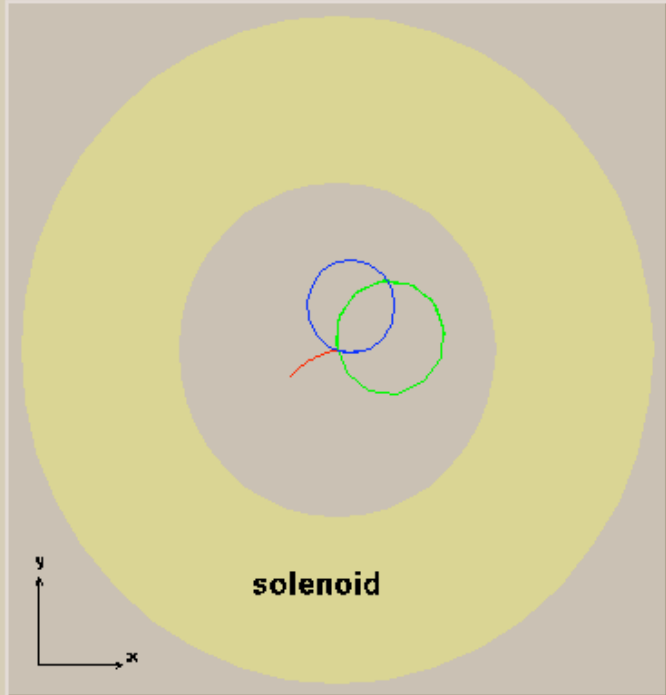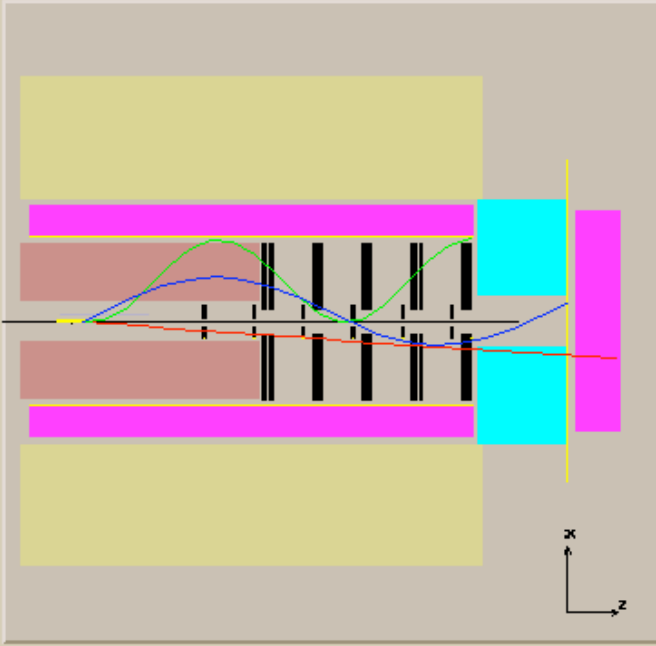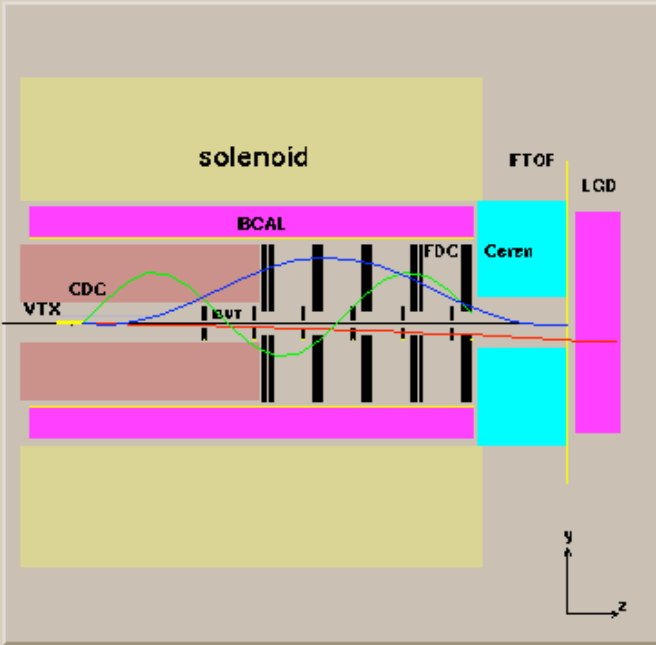
Ab Initio Simulation

HDGeant - based on CERN's Geant3

- Detailed simulation with full shower development and tracking of secondary particles

- Produces digitized "hits" which can be flagged with the track number

- Used primarily for backgrounds so far (no track reconstruction)

HDGeant Geometry

Data Model/Analysis Framework

➢ Framework will incorporate object-oriented approach to communicate data between analysis packages

➢ I/O will be implemented through an abstraction layer removing distinction between online and offline

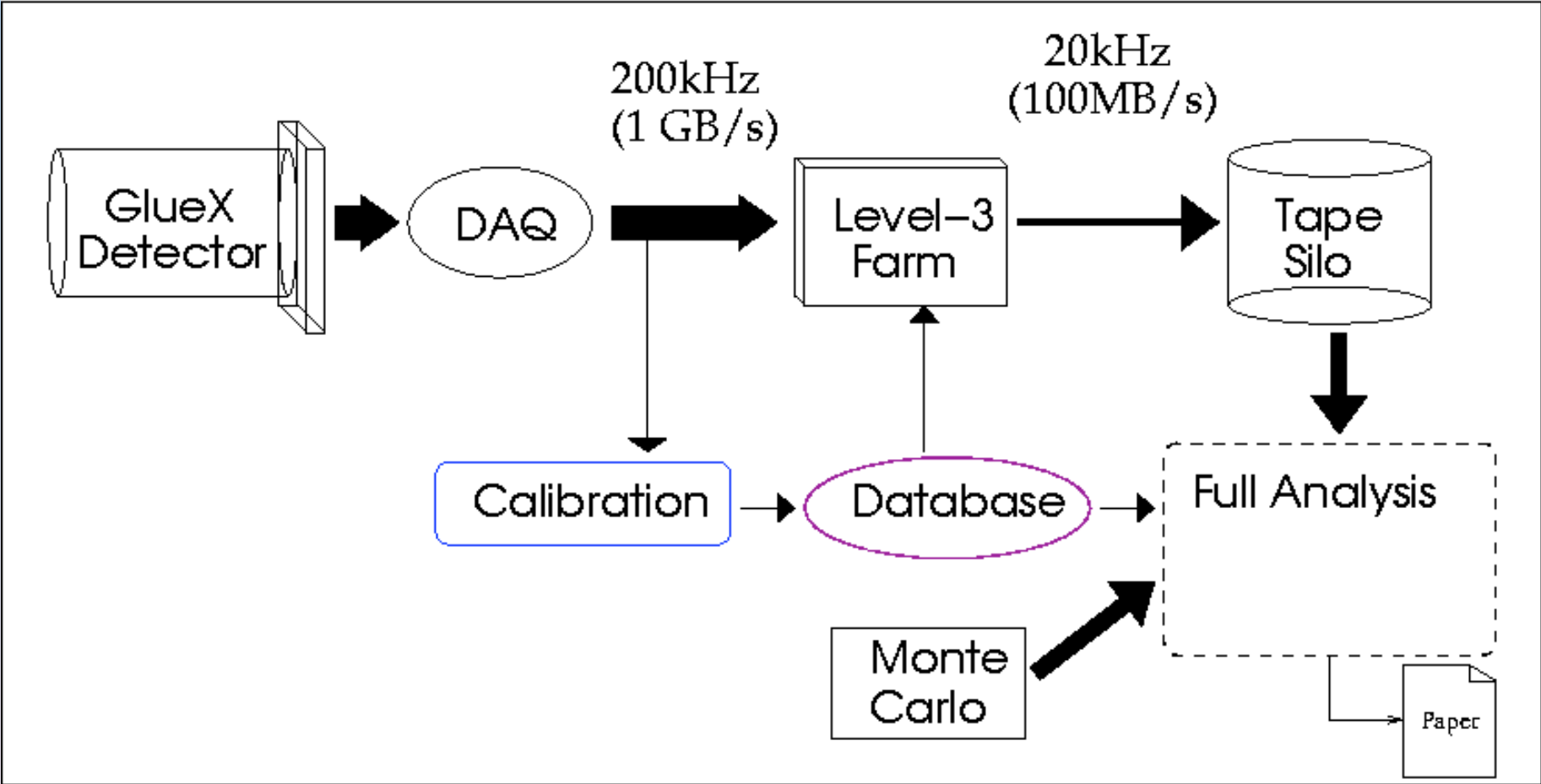➢ Simulated data will be accessed in the same way as real data

Data Volume per experiment per year
(Raw data to tape in units of GB)
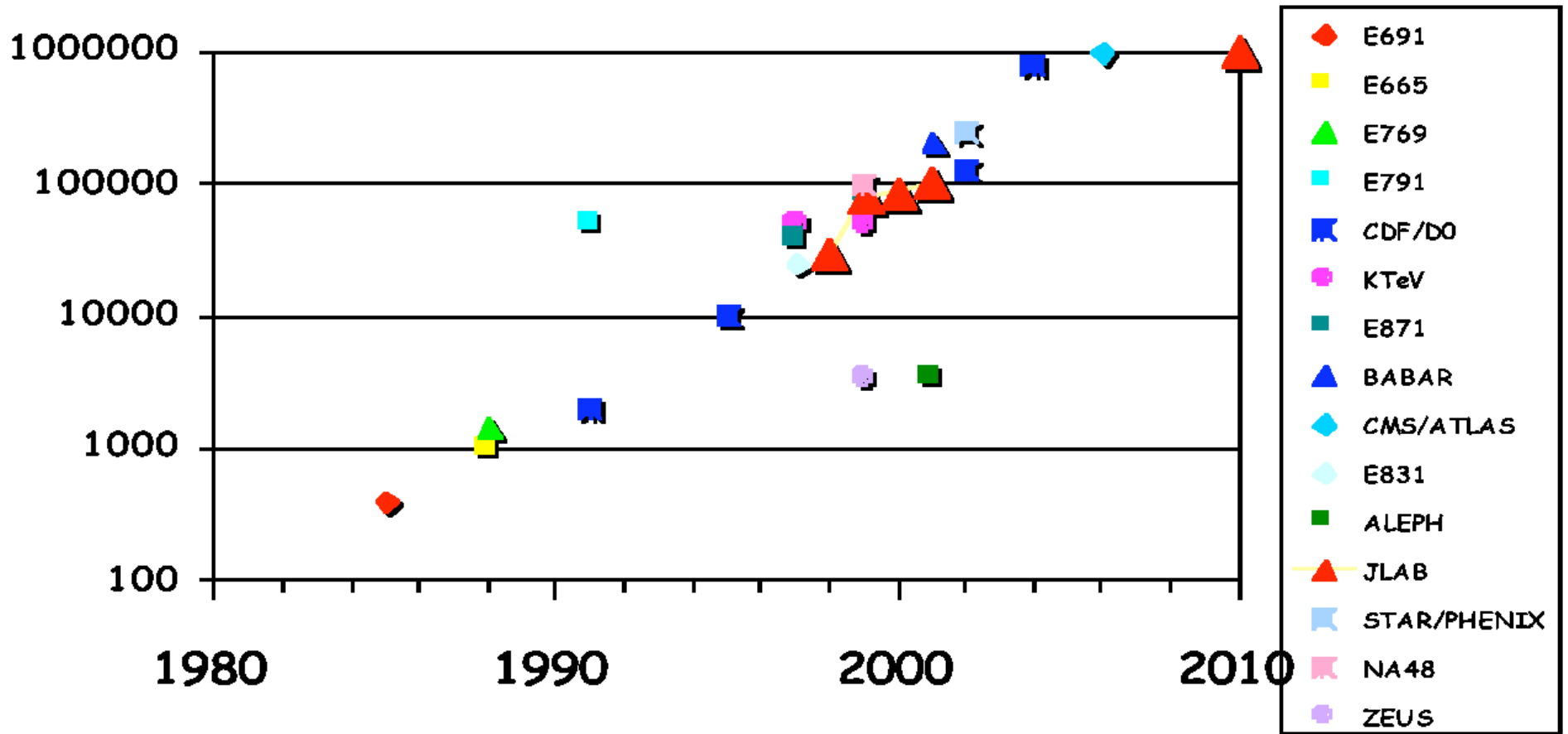
Plot by Ian Bird circa 2002

Data Flow

Data Flow
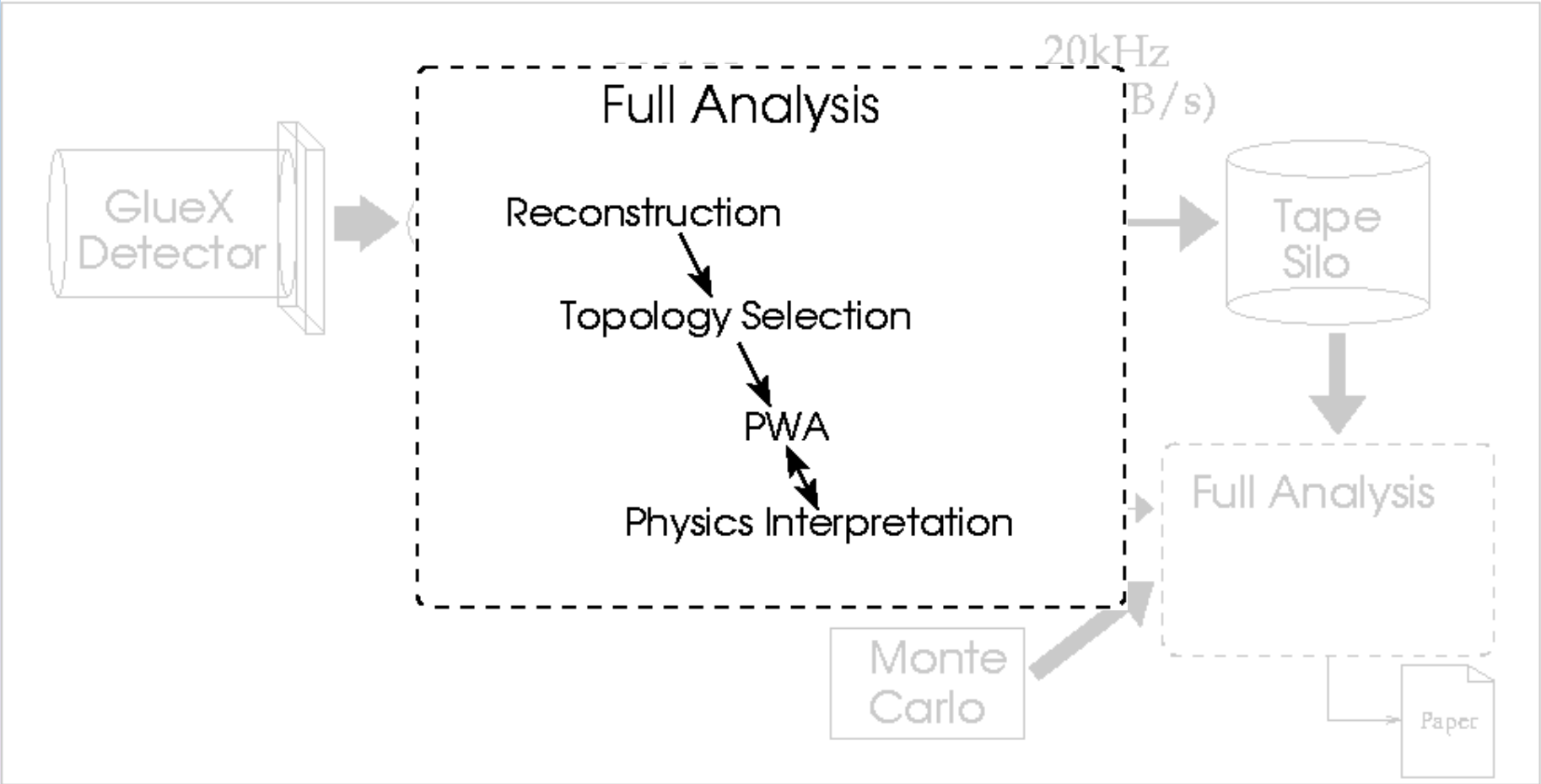
Data Management/Data Access

- ➢ Primary data storage will be on JLab silo
- ➢ DSTs will also be distributed on GRID for easier access by outside institutions
- ➢ GRID services will also be used for simulated data and analysis
- ➢ GRID services are being developed by JLab CC in cooperation with other national labs.
- ➢ LHC will utilize GRID services heavily when they come online (before Hall-D)

Database

The database will be used for:

- Channel assignments (HV, signal, …)
- Run dependant info (e.g. beam conditions, file names, number of events etc…)
- Calibration constants
- Data quality metrics (e.g. avg. pions/event)

Database will **not** be used for event based data

Code Management

➢ Code must be kept in a central location easily accessible to all collaborators

➢ A mechanism must exist for keeping track of software changes, logging comments, and tagging versions

➢ Currently using **CVS**, but a move to **BitKeeper** is planned

Documentation

Documentation of the source code will be _automatically_ generated from the source code via **Doxygen** **_(example)_**

- Provides web-based documentation on class and structure definitions
- Allows narrative documentation to be embedded in source code files

Additional Software

➢ Online (slow controls, monitoring, …)

➢ PWA (Hall-D will benefit from work on CLAS, E852, and CLEO)

➢ Web Resources (GlueX portal http://portal.gluex.org , …)

Project Size Based on CLAS

	Detector Systems	Lines of Code
CLAS	7	390k
GlueX	9	300k-500k

Near term Software Development

- Begin work on global tracking using "cheat codes" from GEANT

- Additional smearing of GEANT data (knock dead channels, add noise)

- Segment finding in individual detector systems

- Calibration Database design

Summary

- Parametric(HDFast) simulation has been developed and used over past 6 years
- Ab initio(HDGeant) simulation with detailed geometry definitions (background studies)
- A Data Model and Analysis Framework have already been developed
- Short-term(e.g. tracking code) and long-term(e.g. GRID services) tasks are in active development

Development History