STAR simulations

GSTAR framework

OO geometry/event model

NOVA components

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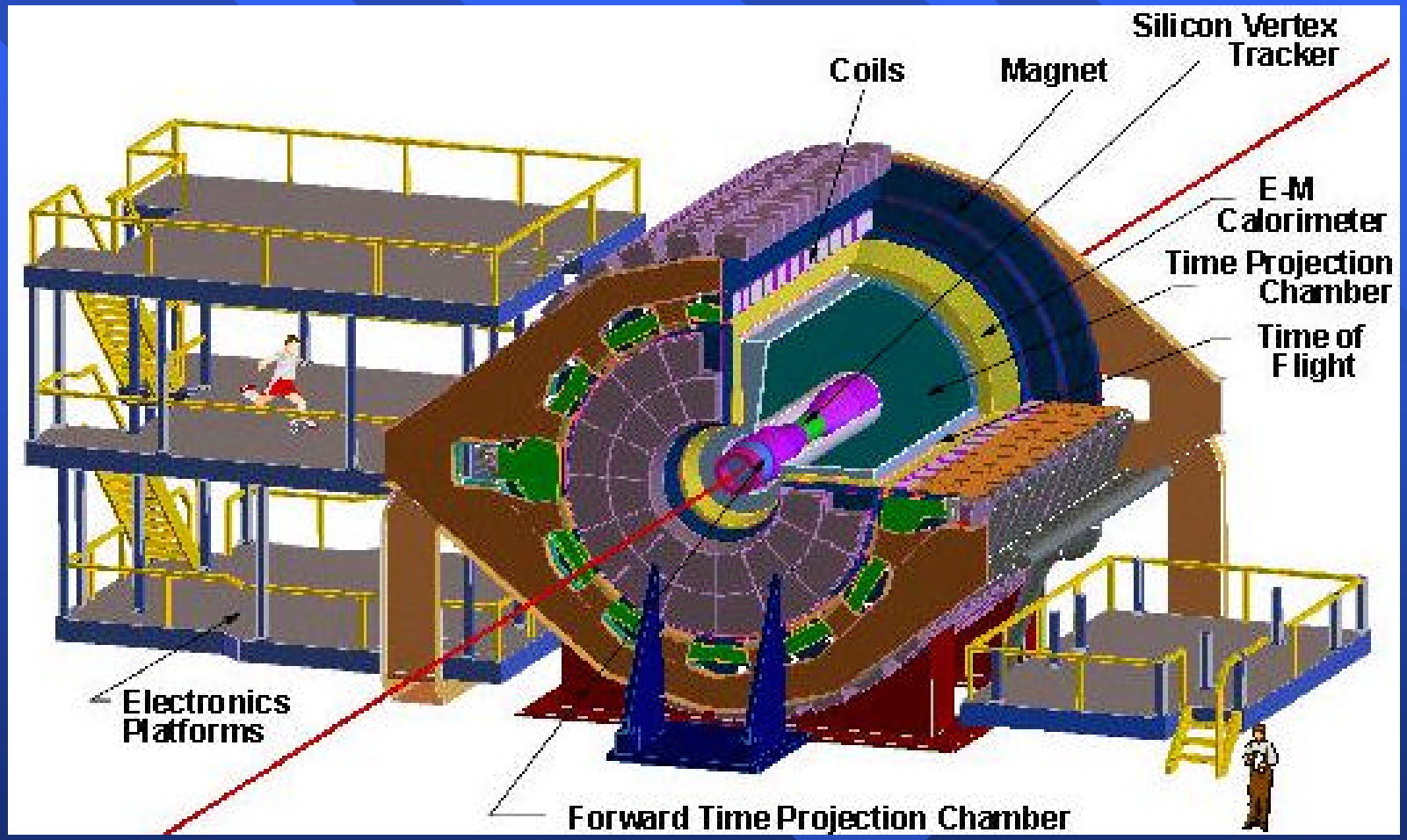
STAR detector at RHIC



GSTAR

- STAR simulation framework since 96
- has a hierarchical design to clearly separate user code from implementation details
- has improved memory management
  - » elastic ZEBRA (using malloc)
  - » no limits on number of tracks, vertices, hits etc (apart from physical memory limits)
- has built-in interfaces to implementation
  - » Geant3/PAW, MySQL, ROOT

Hierarchical design

- Open System Interconnection (OSI) model as example: functionality in term of layers
  - basic (physical) layer - platform dependant code, system libraries,graphics etc
  - low (logical) layer - ZEBRA, DZDOC,HIGS
  - upper (transport) - G3, Paw+Kuip, DB, ROOT
  - system (session) - AGI, ROOT accessors
  - user (application) - modules in F, AGI, C++

STAR geometry

- Formalized description in specification language, including hits and DB access
- Many developers, very detail geometry (almost 2,000 different volumes)
- Altogether less then 8000 lines including field parameterization , easy to read
- No step routine is needed in most of the detectors, no “if statement” problem

GSTAR performance

- Fast enough - 30 min/10,000 particles, with a general 1 MeV cuts
- Calorimeter cuts tuned with test beam date down to 50 KeV
- Interfaced to all event generators
- Robust and well debugged production tool

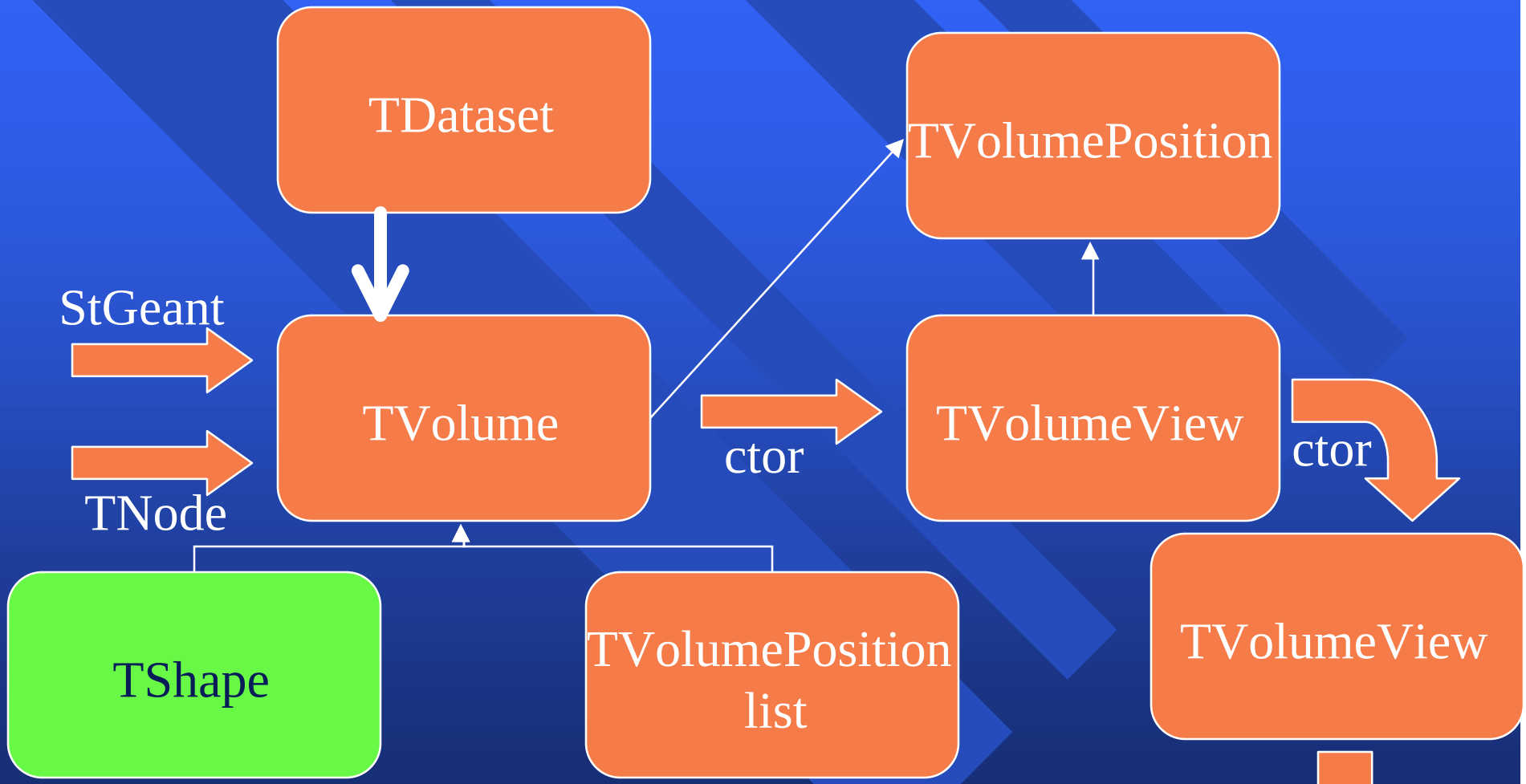
Requirements for rOOt interface

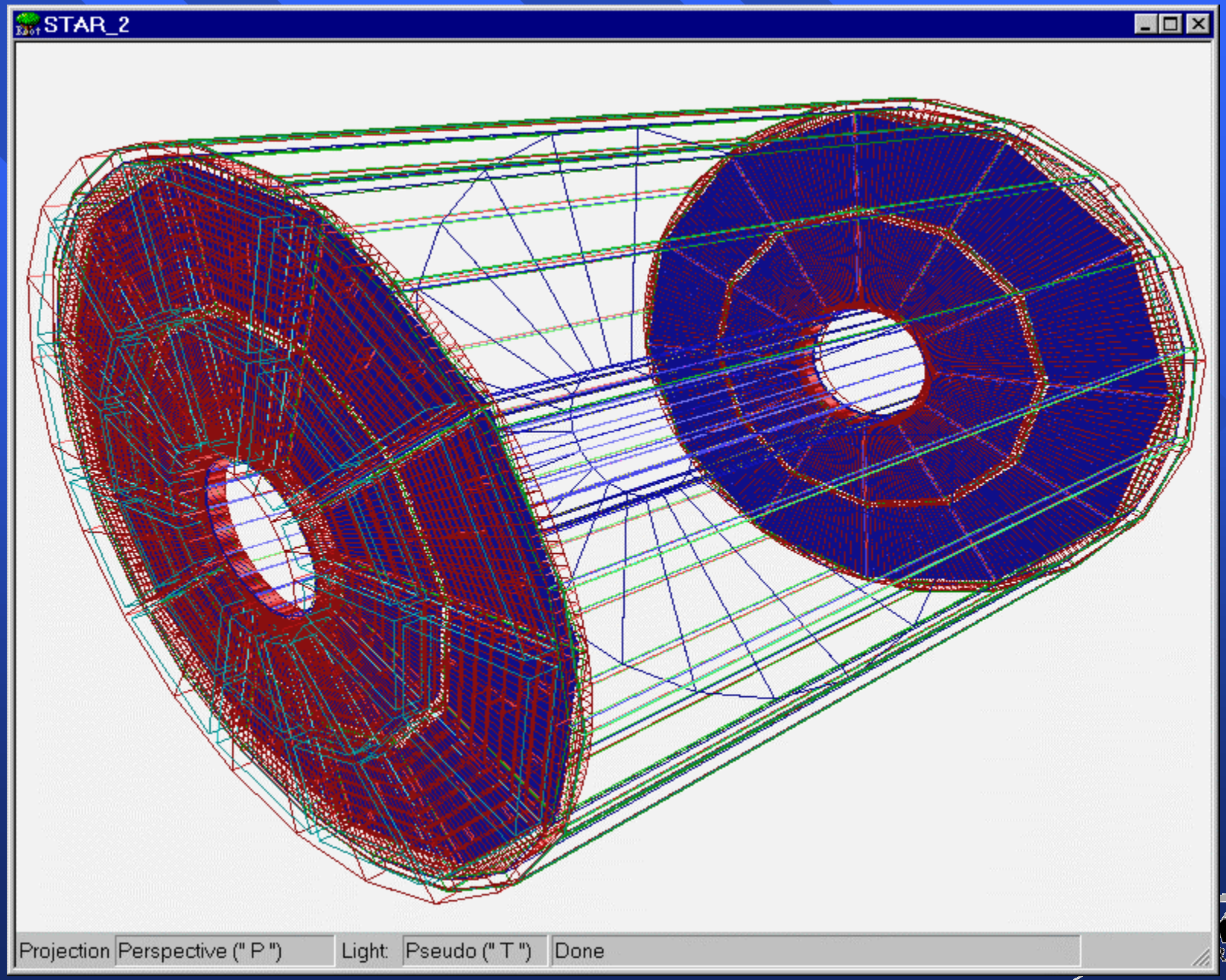
- Flexible, expandable access to geometry objects from reconstruction program
- Modern visualization and navigation
- Access to hits from a C++ code as if they were normal C++ objects
- fun, and even more fun

New elements

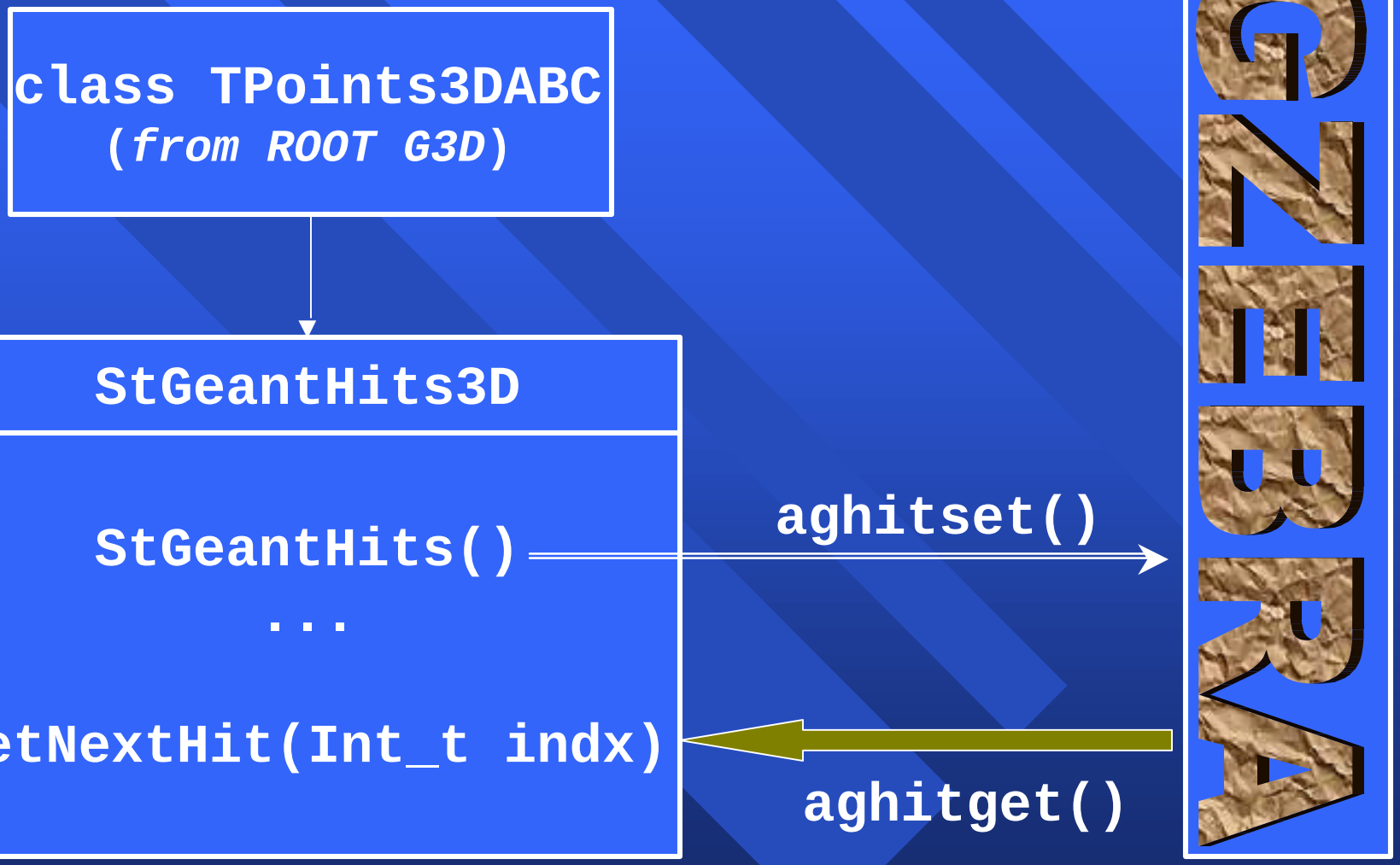
- Initially missing elements
  - Geometry navigator - trivial
  - Geometry decoder - not so trivial, but feasible
  - Volumes and positions separately - TVolume
  - Volumes as position container - TDataset
  - Hit navigator - trivial
  - Hit presenter - StGeantHits

G3 geometry model

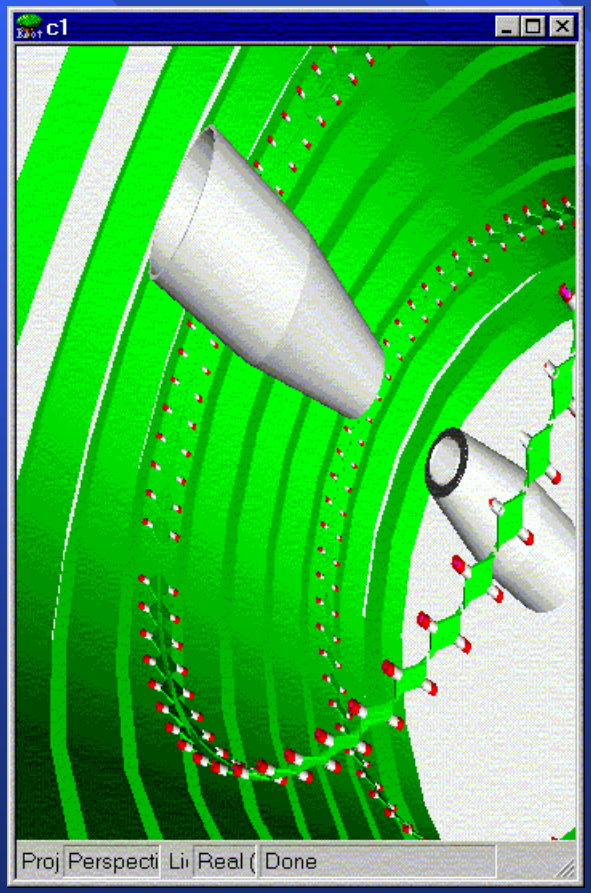


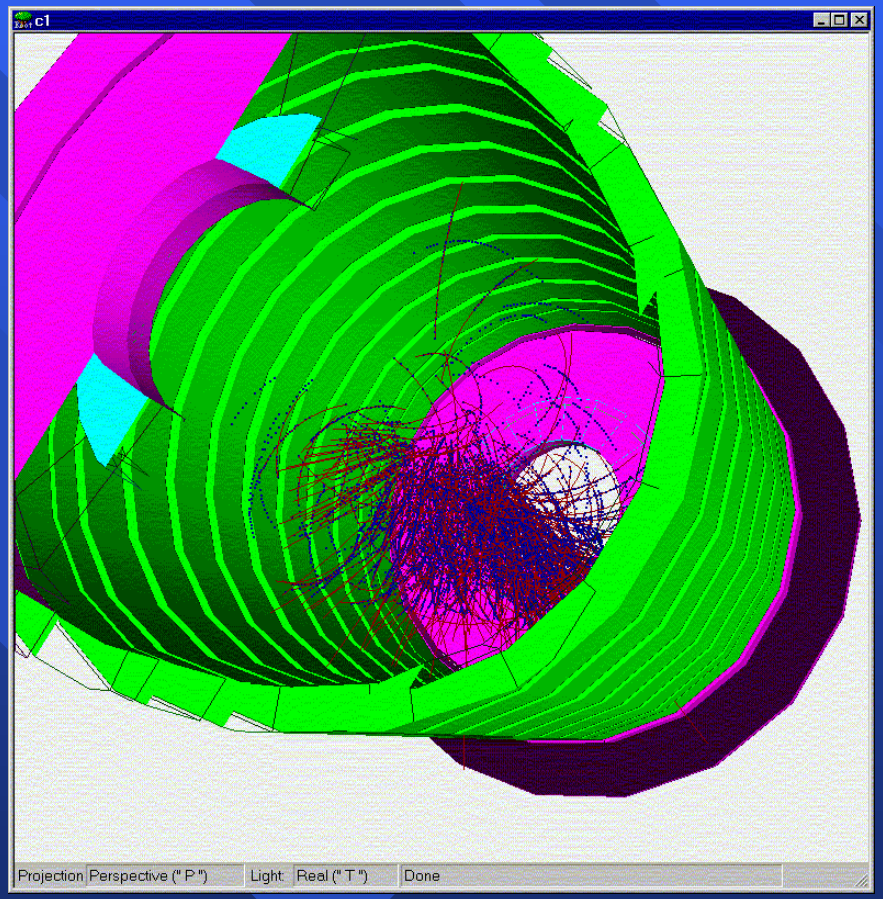

STAR_2
Projection
Perspective (" P ")
Light:
Pseudo (" T ")
Done

Geant Hit Access Class



OpenGL viewer





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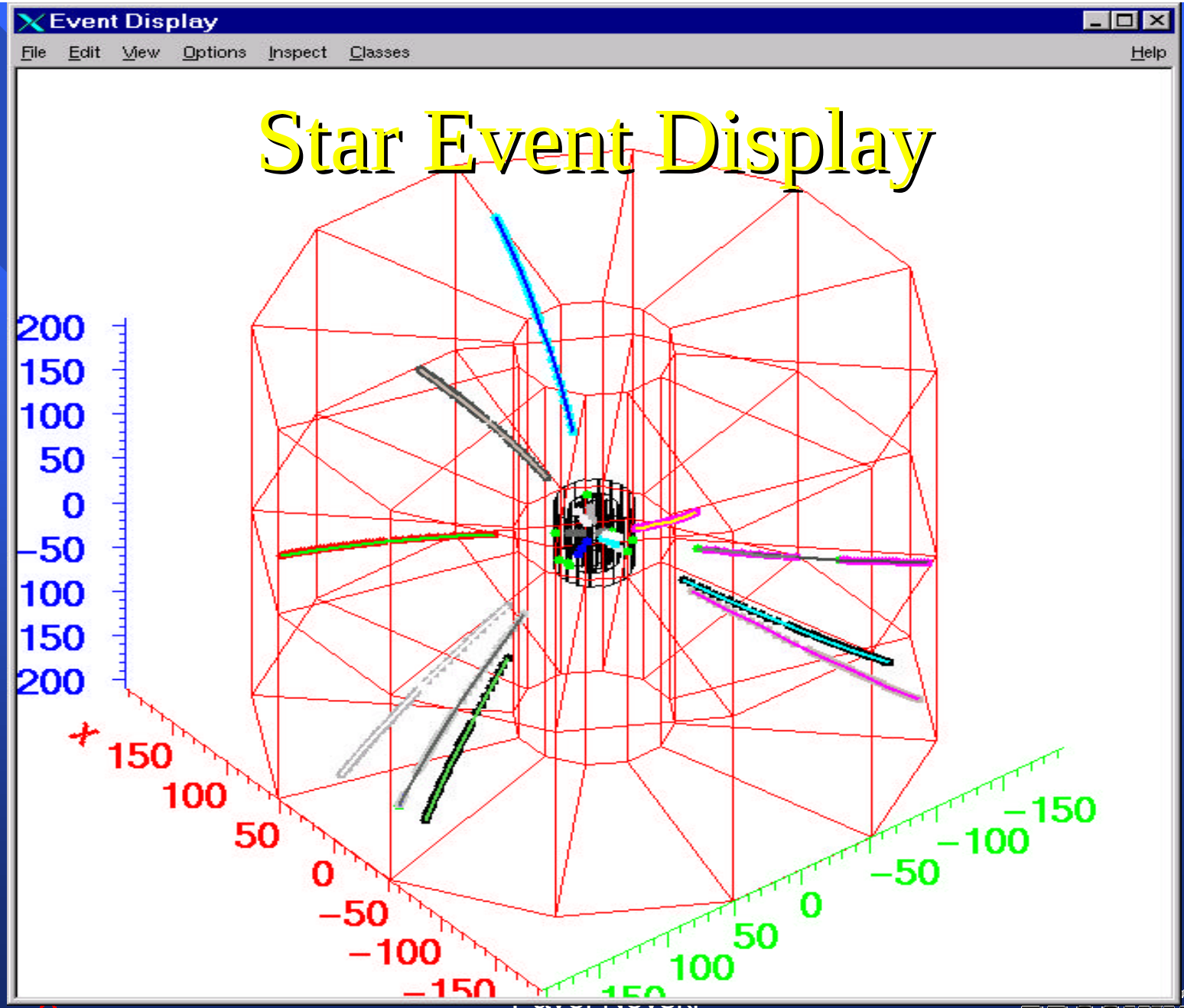
Star Event Display



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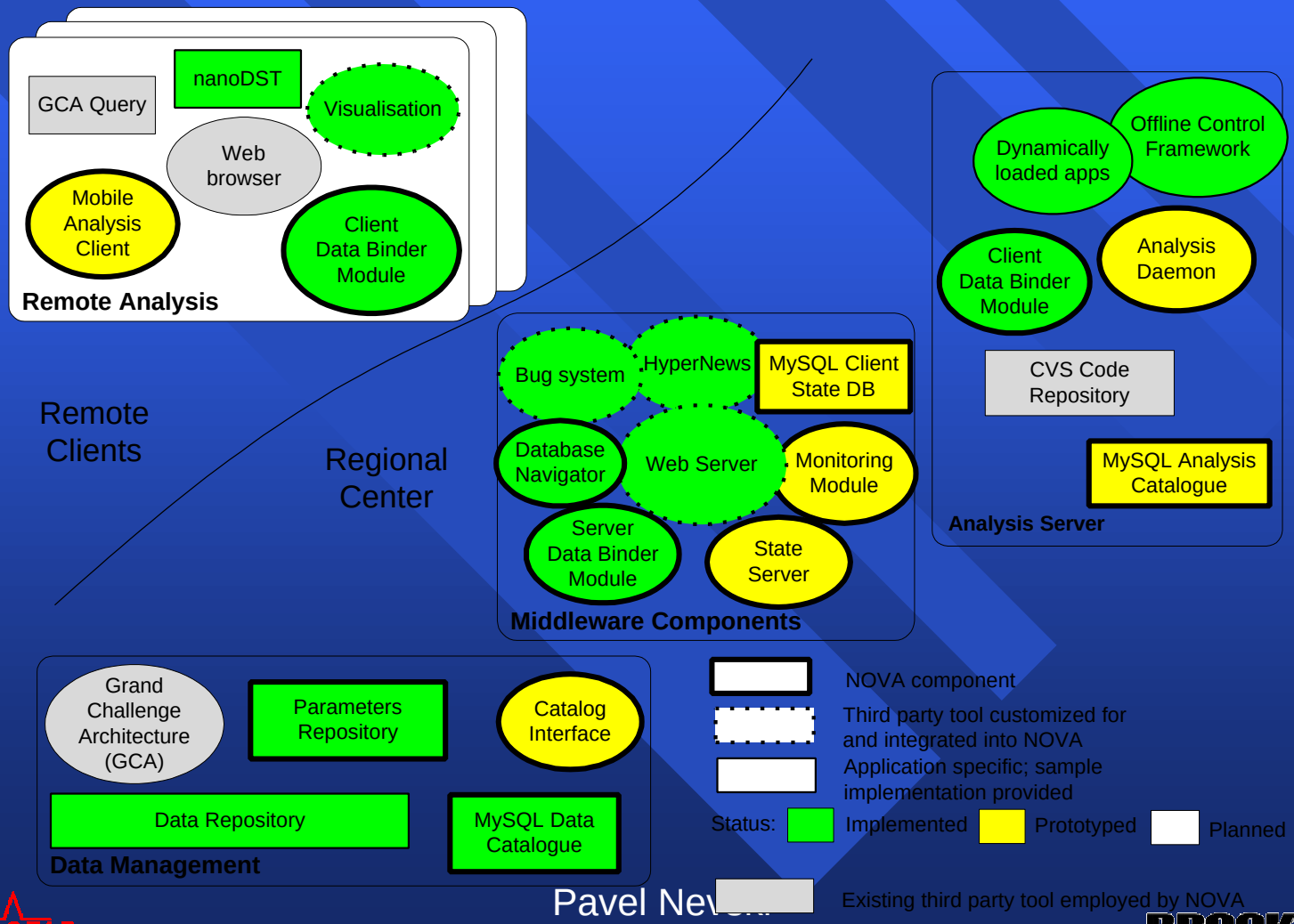
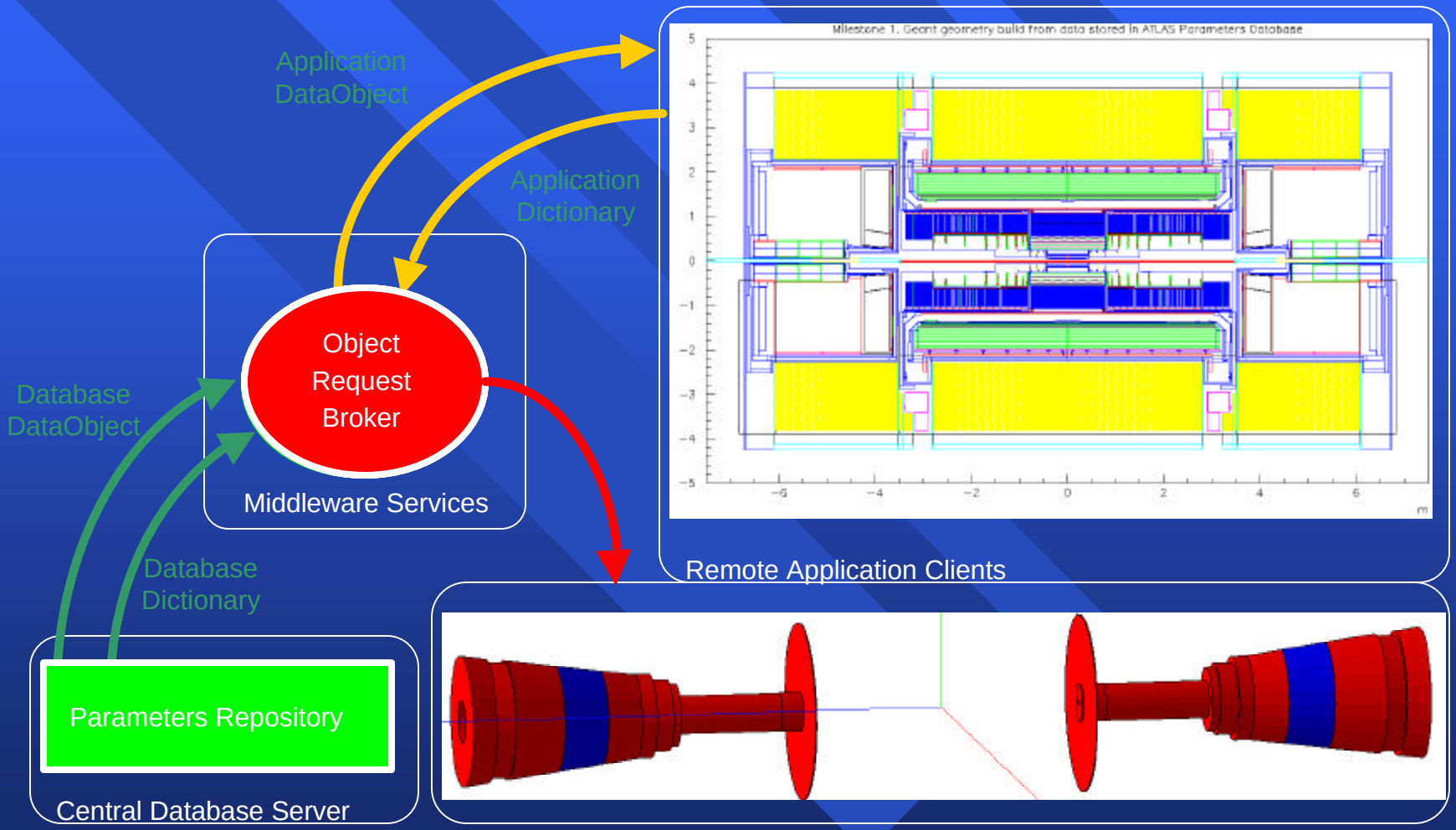
NOVA Architecture



Dynamic Object Broker



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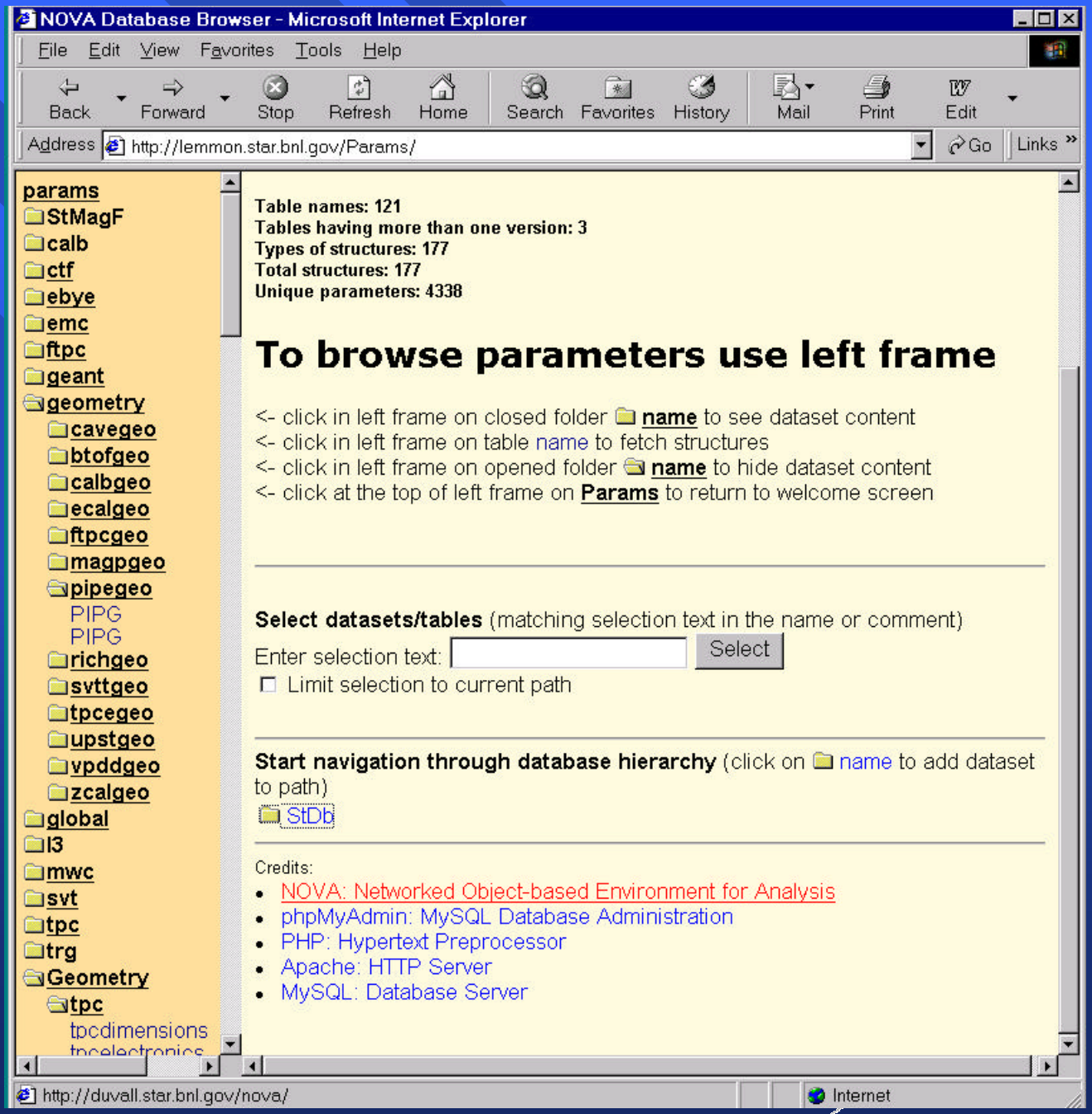
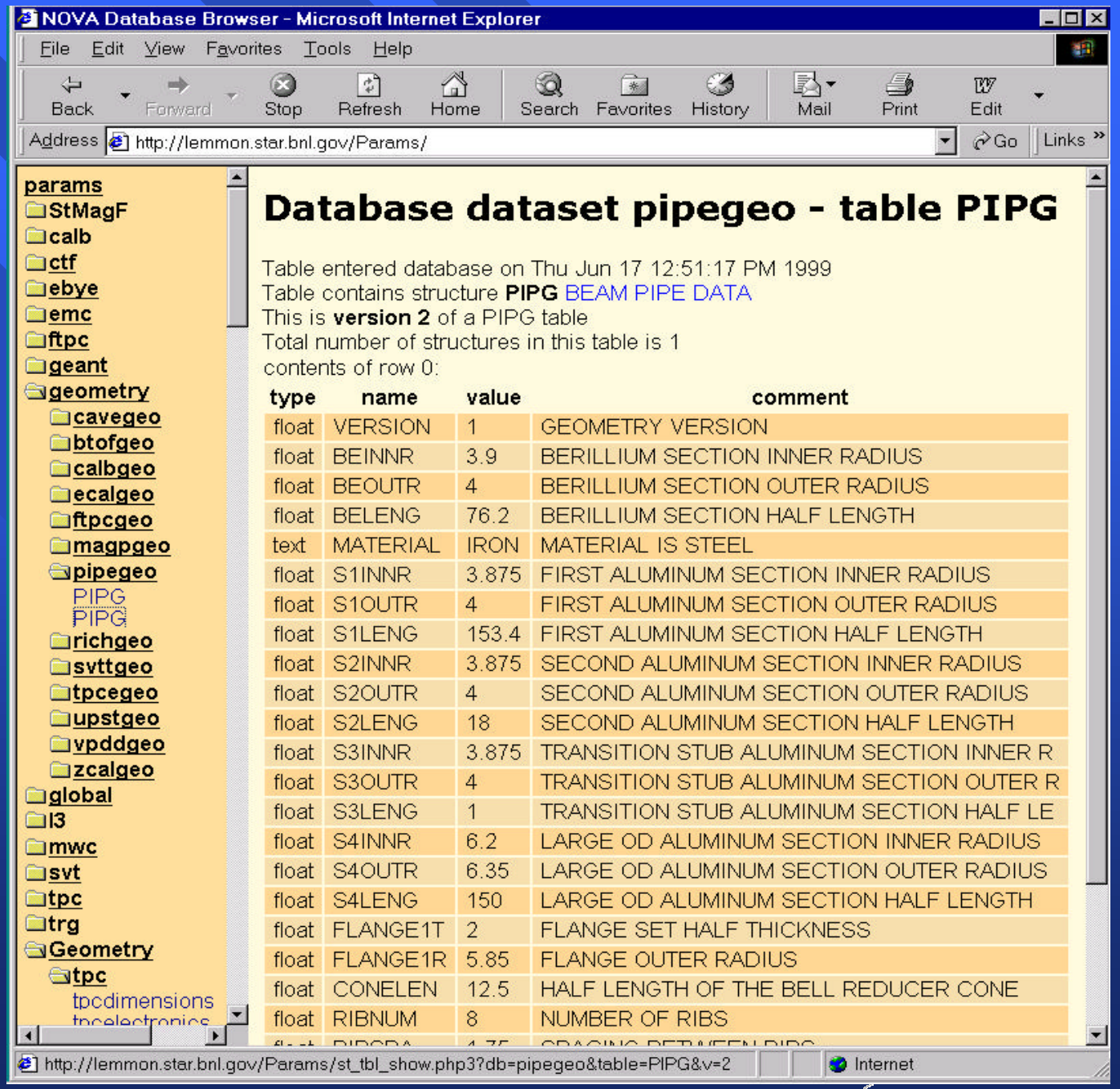
STAR geometry

- Modules: 14
- Structures: 34
- Instances: 45
- Parameter values: 841



Database Browser

- Versioned geometries



Simulation Production

- Multilayer model (NOVA component)
  - universal Simulators (smart cockroaches)
  - common Dispatcher - token coordinator
  - output/QA Filter
  - HPSS Sinker
- Open system - extendable functionality

Production bandwith

- simulation - 50 ev/day/processor - scales well
- dispatcher - scalability tested up to 10K ts/day
- filtering - local disk I/O - no limit at 1 TB/day
- sinking - stable up to 1 GB/day

Conclusions

- GSTAR is a stable production tool
- G3 geometry is based on MySQL DB
- G3 geometry is available as ROOT classes
- Looking for a G4 interface