

THE GOAL OF THE NFC IS TO ADVANCE SCIENTIFIC UNDERSTANDING & INNOVATION IN FUSION RESEARCH

Collaboratory is required to advance fusion science: geographically diverse community (37 states, 3 large experiments), leading to 1 worldwide experiment



Fusion Collaboratory

- **Diverse team**
 - ANL: DSL & FL
 - GA: DIII-D Fusion Lab
 - LBNL: Distributed Systems
 - MIT: C-Mod Fusion Lab
 - Princeton Computer Science
 - PPPL: NSTX Fusion Lab
 - U. of Utah: Scientific Comp. & Imaging
- **Objective is to advance fusion science**
 - Experimental facilities
 - Integrate experiment, theory, modeling
 - Create a common toolkit for services



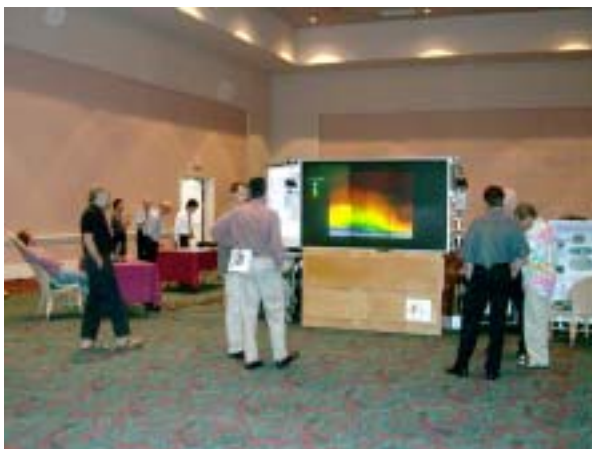
FIRST YEAR ACCOMPLISHMENTS OF THE NFC

Grid Computing

- FusionGrid created: MDSplus data system secured with Globus GSI
- FusionGrid released with complete monitoring: TRANSP & GS2 fusion codes remotely accessible via Globus/Akenti and fine-grain authorization via GRAM
- FusionGrid used for scientific calculations presented at the APS/DPP Mtg
- Prototyped: between pulse pre-emptive scheduling, parallel MDSplus I/O

Visualization

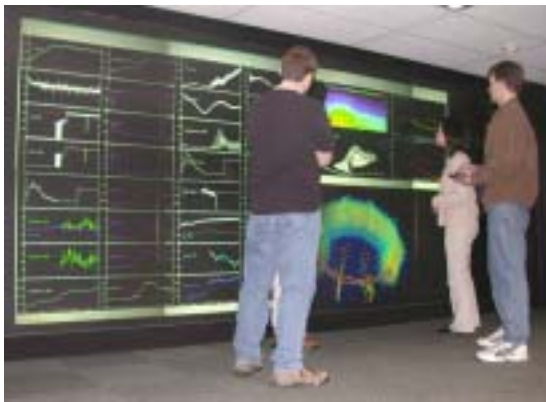
- SCIRun 3D visualization of NIMROD fusion data via MDSplus
- SCIRun visualizations used for scientific work presented at APS/DPP
- Access Grid functional on Tiled Wall as well as small scale system (PIG)
- Collaborative Visualization: Wall to wall/workstation (VNC, DMX), ELVis



**Culminated in a full demonstration
at the Nov 2002 APS/DPP meeting
attended by over 1000 fusion scientists**

NFC'S TOOLS AND TECHNOLOGIES

- **Secure MDSplus using Globus GSI available**
 - Authentication and Authorization using DOE CA
- **TRANSP available for worldwide usage on FusionGrid**
 - Beowulf cluster, client application, complete job monitoring
 - Secure access by Globus GSI, Akenti, DOE Grids CA
- **Personal Access Grid (PIG) software and specifications available**
 - Installed at MIT and GA; PPPL has large AG node
- **SCIRun for 3D visualization including MDSplus stored Fusion data**
- **Toolkits for sharing visualization wall to wall and on AG**
 - Tiled walls at GA and PPPL



NFC'S COLLABORATIONS AND INTERACTIONS WITH OTHER PROJECTS

- **SciDAC Center for Extended Magnetohydrodynamic Modeling**
 - NIMROD data in MDSplus visualized by SCIRun presented at APS/DPP
- **SciDAC Plasma Microturbulence Project**
 - GS2 code being tested on FusionGrid for broader & easier usage
- **Plasma Science Advanced Computing Institute (PSACI)**
 - Strong endorsement of NFC plans & accomplishments by PSACI PAC
- **Data Grid Toolkit; Security & Policy for Group Collaboration; Distributed Security Architecture**
 - Secure access, authentication, authorization, Globus GSI/Akenti
- **Particle Physics Data Grid; DOE Science Grid**
 - Site security, Firewalls, and Grid security; CA for FusionGrid
- **Middleware to Support Group to Group Collaboration**
 - AG development: user education & testing & feedback
- **eServices Infrastructure for Collab Science; Portal Web Services**
 - NFC & Fusion science as customer

