



Enabling Grids for E-science

# Fusion Session Remarks

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[www.eu-egEE.org](http://www.eu-egEE.org)



- **4 Talks.**
  - “Fusion Results within EGEE” by F. Castejón
  - “Distributed Task Scheduling for Physics Fusion Applications” by J. Herrera
  - “Interfacing gLite services with the Kepler scientific workflow” by R. Metery
  - “Optimisation Applications Support in RDIG Fusion VO” by V. Voznesenski
- **About 30 attendants.**
- **Live discussion (session ended at 18:30 !)**

<http://grid.bifi.unizar.es/egee/fusion-vo/>

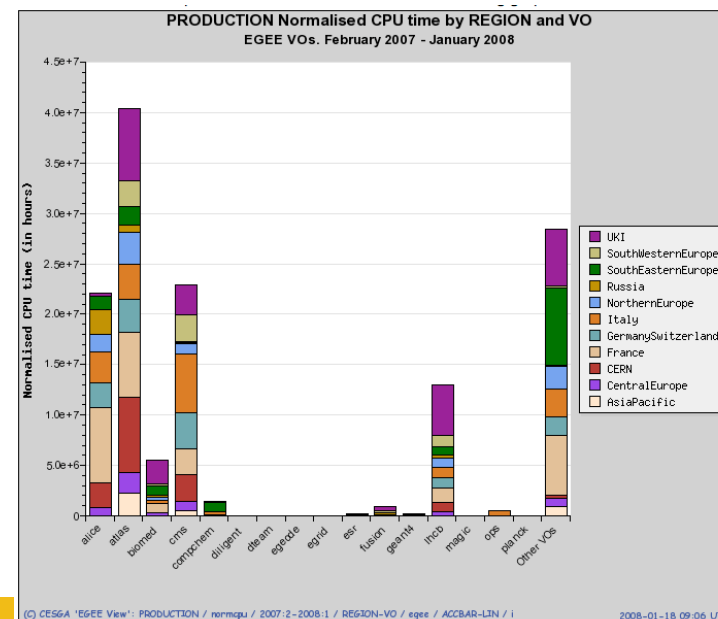
<http://www-fusion.ciemat.es/collaboration/egee/>

- **14 Partners ~ 4500 CPUs  
~ 45 Tflops**

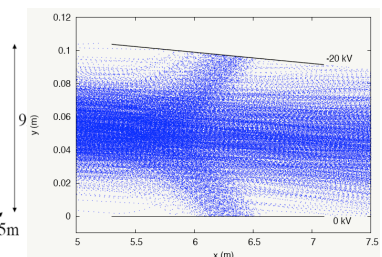
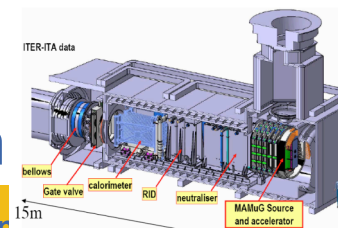
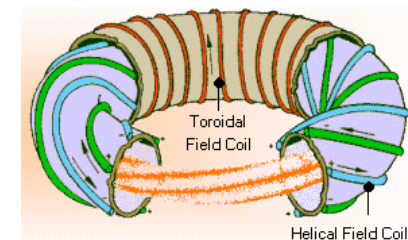
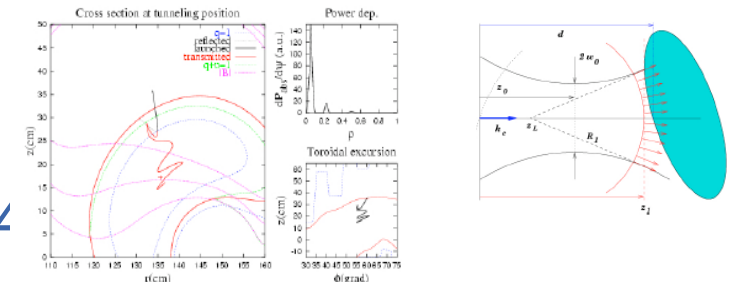
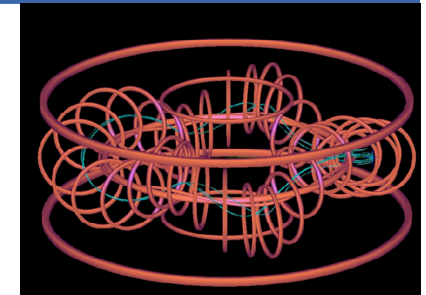
[project-eu-egee-na4-fusion-applications@cern.ch](mailto:project-eu-egee-na4-fusion-applications@cern.ch)

**Fusion:**

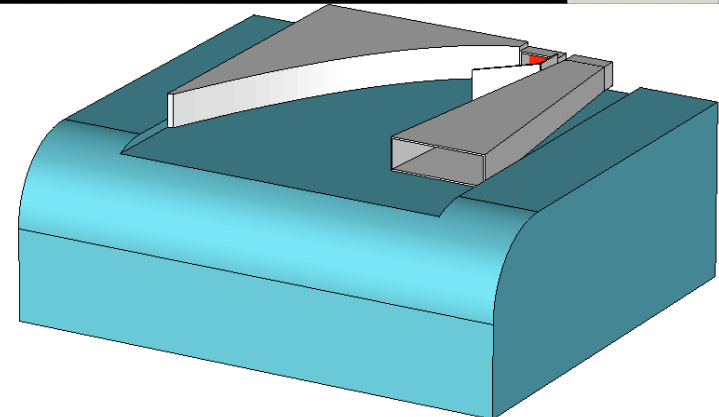
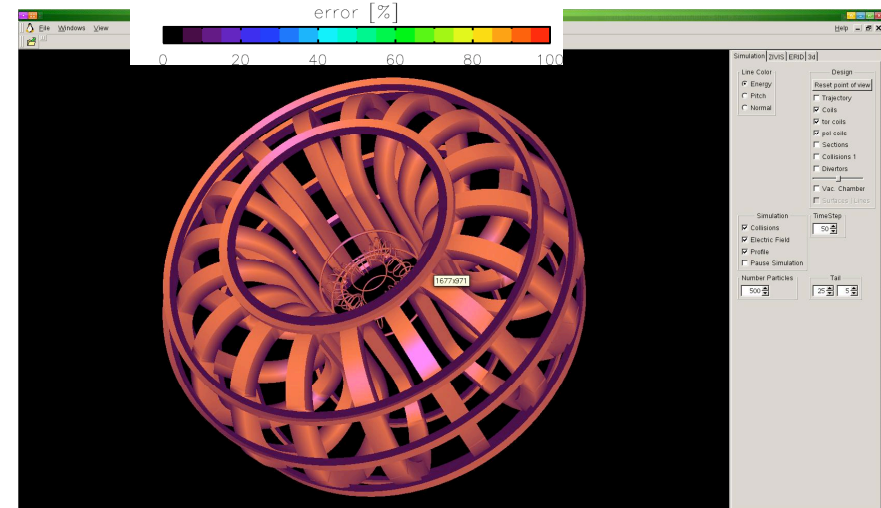
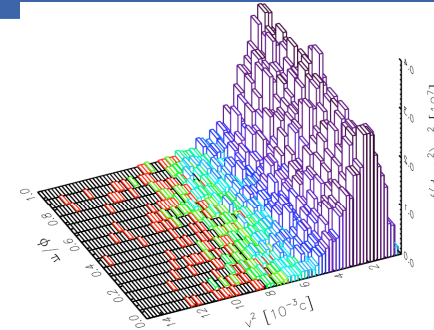
**The most demanding after HEP and Biomed.**



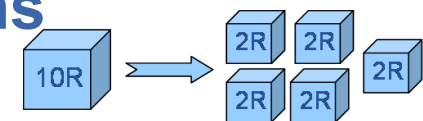
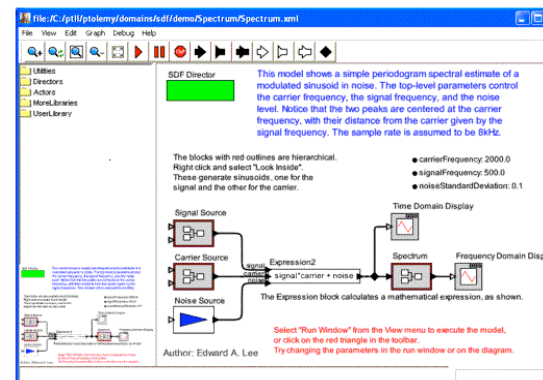
- **Ion Kinetic Transport (ISDEP).**
- Following independent particle orbits
- $(10^6 \text{ orbits}=\text{jobs}) \times 10 - 20 \text{ min}$
- **Massive Ray Tracing (MaRaTra).**
- Simulating microwave beams
- by independent rays  $(10^5 \text{ rays}=\text{jobs}) \times 4$
- **Stellarator Optimization.**
- Choosing the best configuration. GIF Portal
- $(10^5 \text{ configurations}=\text{jobs}) \times 40 \text{ min}$
- **ERID simulation for ITER NBI heating.**
- Trace particle trajectories in ITER NBI
- heating  $(10^6 \text{ trajectories}=\text{jobs}) \times 5 \text{ min}$



- **Ion Kinetic Transport Improvement:**
  - Non-linear calculation (30 times the computation time)
  - Tokamak geometry --> ITER
  - Adding new terms, Heating.
- **DKES code (standard neoclassical 3D transport)**
  - Estimate a table of monoenergetic coefficients to calculate transport.
  - Compare with ISDEP
- **Simulation of Reflectometry system for ITER.**
- **VMEC: non-island equilibrium**



- **Stellarator Optimization-DKES**
  - Every Case triggers DKES execution in the grid
- **ISDEP - EIRENE**
  - The flux of ions onto the wall (estimated in the grid) is the input for EIRENE (MC code of neutrals).
- **MaRaTra - ISDEP**
  - The power density distribution in the device is given by MaRaTra.
- **Kepler Workflow engine**
- **is under consideration.**
- **Gridway Metascheduler launches applications**
- **and distribute the jobs to the sites.**



## **EUFORIA: EU fusion for ITER Application**

- **New Project connected with EGEE.**
- **Provide a work & infrastructure frame for fusion simulation, linking fusion, grid and supercomputing communities.**
- **Improve the modelization capacities for ITER through the adaptation, optimization, and integration of a set of applications that can exploit and join the core-edge transport.**
- **New serial and parallel codes to be ported to the grid (4 codes in the first step).**



- **Fusion VO in EGEE used for scientific production in Fusion Research.**
- **New Relevant scientific results obtained with grid capabilities.**
- **Complex Workflows are being established. Kepler workflow orchestration is a promising tool.**
- **New Project Euforia: Opportunity for bringing more partners of Fusion Community to Grid Computing.**
- **Workflows between Grid-HPC based on Kepler workflow orchestration is the final goal of EUFORIA.**



eGee  
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for E-science



EUFORIA

