

**CERN Fact Finding Mission to Serbia
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SCL: Insights to nature through scientific computing

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SCL: Vision and Mission

- **Scientific computing** has become a tool as vital as experimentation and theory for dealing with R&D challenges of the 21st century.
- SCL vision:
to be **the focal points for high-performance computing in Serbia** as well as in the region of South East Europe.
- SCL mission:
 - Use simulations and models as heuristic tools in a broad problem-solving process
 - Perform cutting edge research in the field of complex systems and analysis of emerging properties
 - Provide HPC services for Serbia's researchers

S&T at SCL

Science

- Research topics:
 - Efficient path integral calculation
 - Ultra-cold quantum gases, BEC
 - Strongly correlated quantum systems
 - Simulations of granular materials
 - Soft cond-mat (complex networks, social phenomena)
- Main goal: Use of advanced simulation techniques to study complex physical systems

Technology

- Platforms:
 - Cluster integration & GRID paradigm
 - Engineering simulations
- Main goals:
 - Integrate into EU-wide HPC (Grid & SC) efforts
 - State of the art software for FEM analysis acquired

SCL: Human Resources

- 12 PhDs in physics
- 3 reintegrated in the last 3 years
 - 1 from Europe, 2 from US
- 14 Grad Students and Staff



SCL: Projects

National:

- OI141035: national research project, Ministry of Science
- AEGIS: National Grid infrastructure, Ministry of Science

International projects:

- EGI and EGI-Inspire
- PRACE and PRACE-1IP
- HP-SEE
- LA@CERN: Learning with ATLAS@CERN
- SCOPES
- NATO Reintegration Grant
- Bilateral project with Germany

Industry:

- IBM Academic Partnership

Past projects:

- CX-CMCS: EU Centre of Excellence
- EGEE-II and EGEE-III
- SEE-GRID, SEE-GRID-2, SEE-GRID-SCI
- Bilateral projects with Slovenia and France

SCL: Infrastructure (1)

- SCL hosts Serbia's two largest HPC sites
 - Computing nodes: 1000 CPUs, >1GB RAM/CPU
 - Storage elements: over 50 TB
 - Service nodes: 36 CPUs, 84GB RAM
 - 1 Gbps uplink to AMRES; LAN Ethernet, Infiniband
 - 40 kVA UPS; 85 kW cooling; 5000 m³/h air exchange



SCL: Infrastructure (2)

- SCL's two Grid sites participate in AEGIS and EGEE/EGI infrastructures:
 - AEGIS01-IPB-SCL
 - AEGIS07-IPB-ATLAS
- gLite-3.2 Grid middleware
- Sustainable national infrastructure and operations
 - Coordination of Grid operations in Serbia
 - Core services for all major user communities
 - Monitoring framework, tools and services
- AEGIS Virtual Organization (VO)

SCL: Infrastructure usage

- SCL's computing resources are utilized at over 99% efficiency according to EGEE/EGI accounting system
- In the last year, more than 11 million CPU hours were provided to EGEE Grid infrastructure
 - National AEGIS users: 5 million CPU hours
 - ATLAS: 3 million CPU hours
 - Regional SEE usage: 2 million CPU hours

Future Developments

National Supercomputing and Data Storage Facility Blue Danube

- eInfrastructure development
 - Central supercomputing installation + regional centers
 - Integration into pan-European initiatives (PRACE, EGI)
- Development of human resources
 - Creating new jobs
 - Training for HPC resources usage

