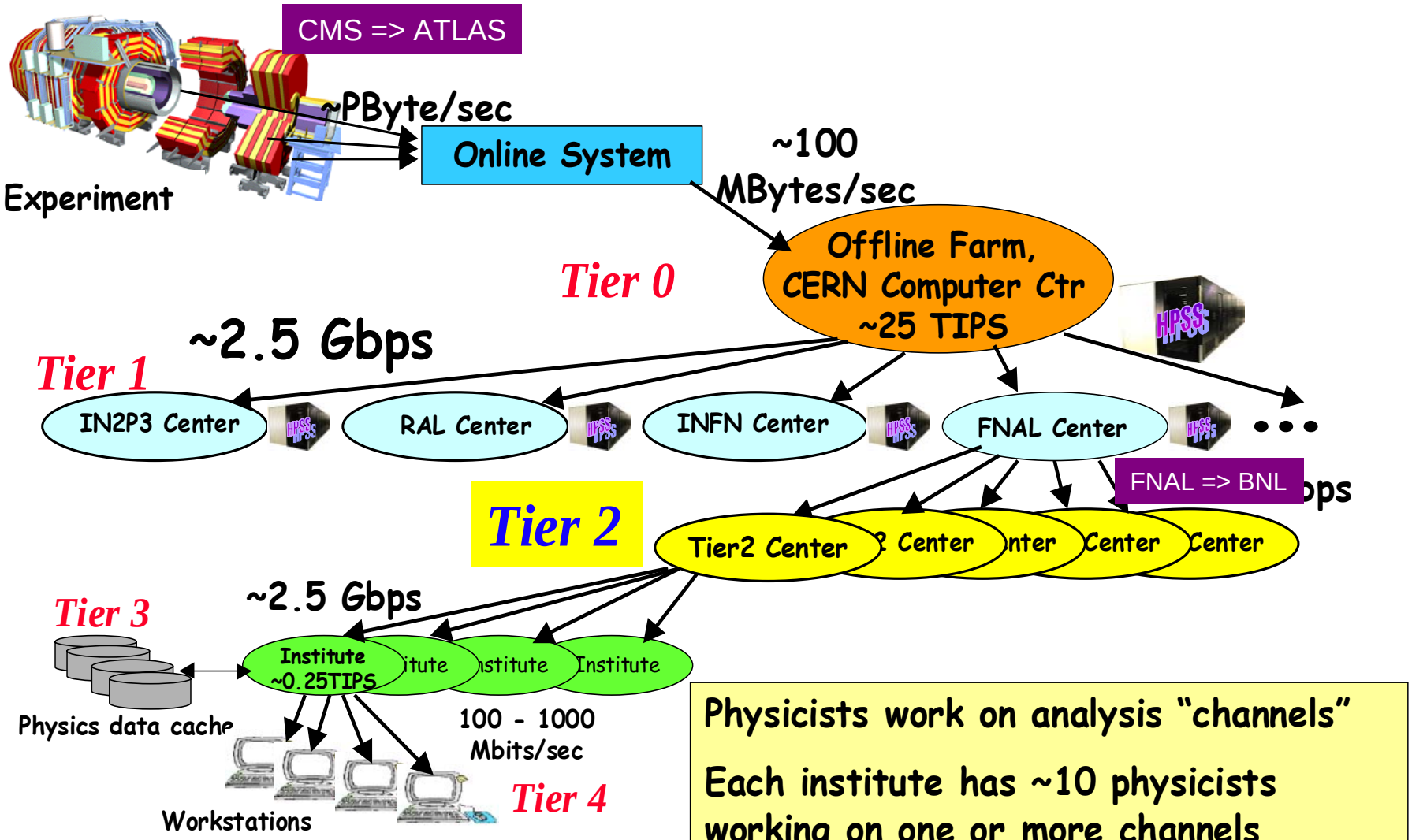
ATLAS Computing at SLAC

1. Tier 2 Computing Center
2. Parameterized Shower Simulation

Tier 2 Computing Center

- LHC tiered computing architecture.
- Specific roles and challenges for Tier 2.
- SLAC's core competence.
- Proposal timeline.
- Western Tier 2 proposal.
- Connection to Analysis Support Center.

Typical LHC Tiered Structure



Physicists work on analysis "channels"

Each institute has ~10 physicists working on one or more channels

Tier 0

- Located at CERN.
- Archiving and distribution of RAW data.
- Prompt reconstruction of calibration and express streams.
- First pass processing of primary event stream.
- Access granted only to central production group and those providing first-pass calibration.

Tier 1

- Approximately 10 world-wide.
  - One in U.S. at BNL.
- Host and provide access to subset of RAW.
- Reprocess, provide ATLAS-wide access to derived datasets, as well as simulated data samples from Tier 2's.
- Part of calibration processing capacity.
- Access restricted to production managers of working groups and reprocessing group.

Tier 2

- Hosting of datasets.
  - Physics samples in accordance with local interest.
  - Special datasets for code development.
- Access to Tier 2 available to all ATLAS members. In practice, heightened access according to local policy.
- Analysis capacity for physics working groups.
- Significant calibration role following local interests.
- Simulation capacity for the experiment.

Tier 3

- Typically a university group.
- Store user ntuples of local interest.
- Should be Grid-enabled but can work off Grid.
- Neither centrally planned nor centrally controlled.

User analyses requiring access to ATLAS-wide datasets (such as RAW, AOD and TAG) rely almost exclusively on Tier 2 centers.

Simulation Production

- Very CPU intensive.
- Modest storage needs.
- Managed activity.
- Understood, controlled and optimized data movement.
- Relatively easy to deal with.

Calibration

- Expect to perform Inner Detector calibration and alignment.
- Matches detector involvement and common interest of traditional SLAC user groups, e.g.
  - Pixel detector – LBNL and SLAC.
  - Semiconductor Tracker – UCSC.
- More challenging than simulation production.
  - Workload often more variable.
  - Access patterns less predictable.

Physics Analysis

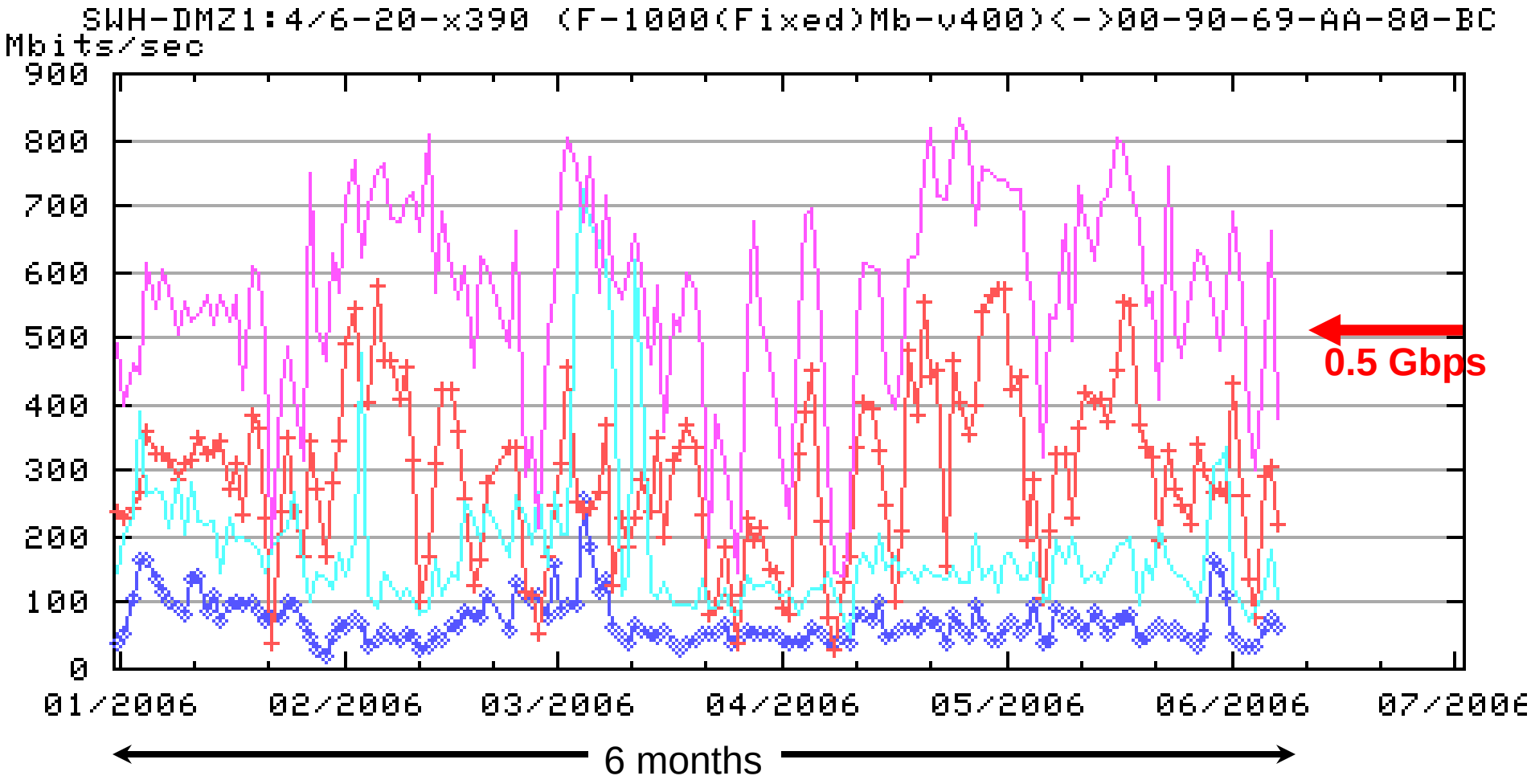
- Analysis capacity concentrated in Tier 2's.
  - Tiers 0 and 1 primarily production sites.
- "Chaotic" data access patterns.
  - Data intensive.
  - Many users and jobs in parallel.
  - Data movement difficult/impossible to predict and optimize.
- Major challenge in scaling.

A truly functional Tier 2 requires much more than just keeping a bunch of boxes running.

Why Tier 2 at SLAC?

- Support the user community.
  - Function of a national lab.
- Strong track record in BaBar.
  - Dealt with similar data-intensive analysis issues.
  - Real-life network utilization.
  - Long-time participant and leader in Grid.
  - Cooperative operation with many other sites.
- Continue to innovate (e.g. PetaCache project).

Network Utilization



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Middleware Security Group Meeting

Date/Time: from Monday 05 June 2006 (09:00) to Tuesday 06 June 2006 (16:00)

Location: SLAC

Chairperson: Bob Cowles, Ake Edlund

Description: *Goal with meeting: Update on current global security architecture work. Discuss future global security architecture work.*

The meeting is in the Research Office Buildng (ROB) - building number 48 on the North side of the campus (30-B) on the map

http://www2.slac.stanford.edu/maps/slacarea.html≠gridMap

The meeting room is Redwood A-B on the south side of the building.

Material: list of attendees

[last update: Wednesday 07 June 2006]

Monday 05 June 2006 09:00->09:15	Kick-off	Bob Cowles and Ake Edlund
Monday 05 June 2006 09:15->10:30	glexec / managing dynamic change of users at runtime	
Monday 05 June 2006 11:30->12:00	WS-naming effort in GGF	Frank Siebenlist
Monday 05 June 2006 12:00->13:00	Deb Agarwal & Brian Tierney	
Monday 05 June 2006 13:00->14:00	Lunch	
Monday 05 June 2006 14:00->17:00	Auditing	
Tuesday 06 June 2006 09:00->13:00	Security Process and Plans	
Tuesday 06 June 2006 13:00->14:00	Lunch	
Tuesday 06 June 2006 14:00->16:00	Authorization - Status and Plans	
Tuesday 06 June 2006 14:15->15:45	xrootd	Andrew Hanushevsky
Tuesday 06 June 2006 15:45->16:00	Round-up, summary, what's next	Bob Cowles and Ake Edlund

Monday 05 June 2006

Kick-off (2006-06-05 09:00->09:15) **Chairperson:** Bob Cowles and Ake Edlund

glexec / managing dynamic change of users at runtime (2006-06-05 09:15->10:30)

09:15 **glexec - update** (45') (transparencies) **Gerben Venekamp** *(NIKHEF, NL)*

US ATLAS Tier-2 Timeline

- Three sites chosen in 2005.
  - Northeast (Boston & Harvard).
  - Midwest (Chicago & Indiana).
  - Southwest.
- Two sites to be chosen in 2006.
  - February – Call for Proposals.
  - May – Proposals due.
  - June – Evaluation Committee.
- Decision in July by US ATLAS Managers.
  - Evaluation report.
  - Input from funding agencies.

Western Tier 2 Proposal

- Proposal by SLAC with strong user support.
- Most of Tier 2 funds for dedicated H/W by leveraging existing infrastructure & support.
  - "Lights out" operations for ~10 years.
  - H/W commonality with other projects.
  - Grid experience and expertise.
  - Dedicated and experienced staff in SCCS!
- Scavenge idle resources from other projects.
  - Tier 2 ~15% of BaBar implies significant leveraging potential.

"Western" Tier 2 Community

Western Tier 2 Community

- Participated in proposal writing.
- Members of proposed Advisory Board.

Enthusiastic support of many user groups.

- Other institutions are welcome!

Analysis Support Center (ASC)

- US ATLAS designated three ASC's.
  - BNL.
  - Argonne.
  - LBNL.
- Committed to supporting LBNL in particular.
  - LBNL, SLAC and UCSC form a natural cluster.
  - Overlapping working hours with many institutions.
  - Office and meeting space if needed.
  - Proximity to Western Tier 2 and therefore more responsiveness.

Parameterized Shower Simulation

- Why parameterized showers?
- Why SLAC?
- What are the goals and plans?

Simulation in ATLAS

- Simulation code ~2x to ~10x times slower than planned.
  - Originally planned sample ~20% of real data.
  - Now correspondingly smaller.
- Multiple ways to improve.
  - Code optimization.
  - Shower library.
  - Parameterized shower.

SLAC can contribute in many ways. We can make unique contributions to parameterized shower.

SLAC and GEANT4

- SLAC is a member of GEANT4 Collaboration that provides core code and support.
  - Largest team outside of CERN.
- Extensive core expertise.
  - Deputy Spokesperson and chief architect.
  - Hadronics package coordinator.
- Extensive user expertise at SLAC.
  - BaBar was first major user of GEANT4.
  - Also used by GLAST, LCD, etc.

Parameterized Showers

- Unique capability at SLAC.
  - Core code to enable parameterized showers developed by SLAC GEANT4 member.
  - Relatively new feature.
  - Little user experience in implementation.
- New proposal to ATLAS management.
  - Not in original proposal to join.
  - SLAC expert to mentor and support ATLAS specific implementation effort.
  - Enthusiastic response from ATLAS management.

Plans and Goals

- Short term plan.
  - Manpower found from a US ATLAS group.
  - Engage experts in ATLAS simulation.
  - Engage experts in ATLAS calorimeters.
  - Meeting in early July to kick off the effort.
- Longer term.
  - Develop validation suite.
    - Detector metrics.
    - Physics metrics.
  - Implement and tune parameterization.
- Goal is to converge within a year.

Summary

Tier 2 Computing Center

Parameterized Shower Simulation

- Utilize core competence in the Lab.
- Leverage past investments.
- Support the LHC/ATLAS program.
- Support the user community.