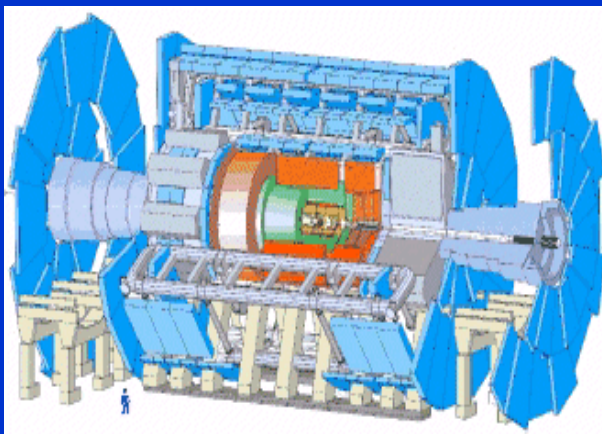


Fresno State and CSU's ATLAS Program at Large Hadron Collider of CERN

Yongsheng Gao

(Physics Department, Fresno State)

2/14/2012 Webinar on CSU HEP Consortium

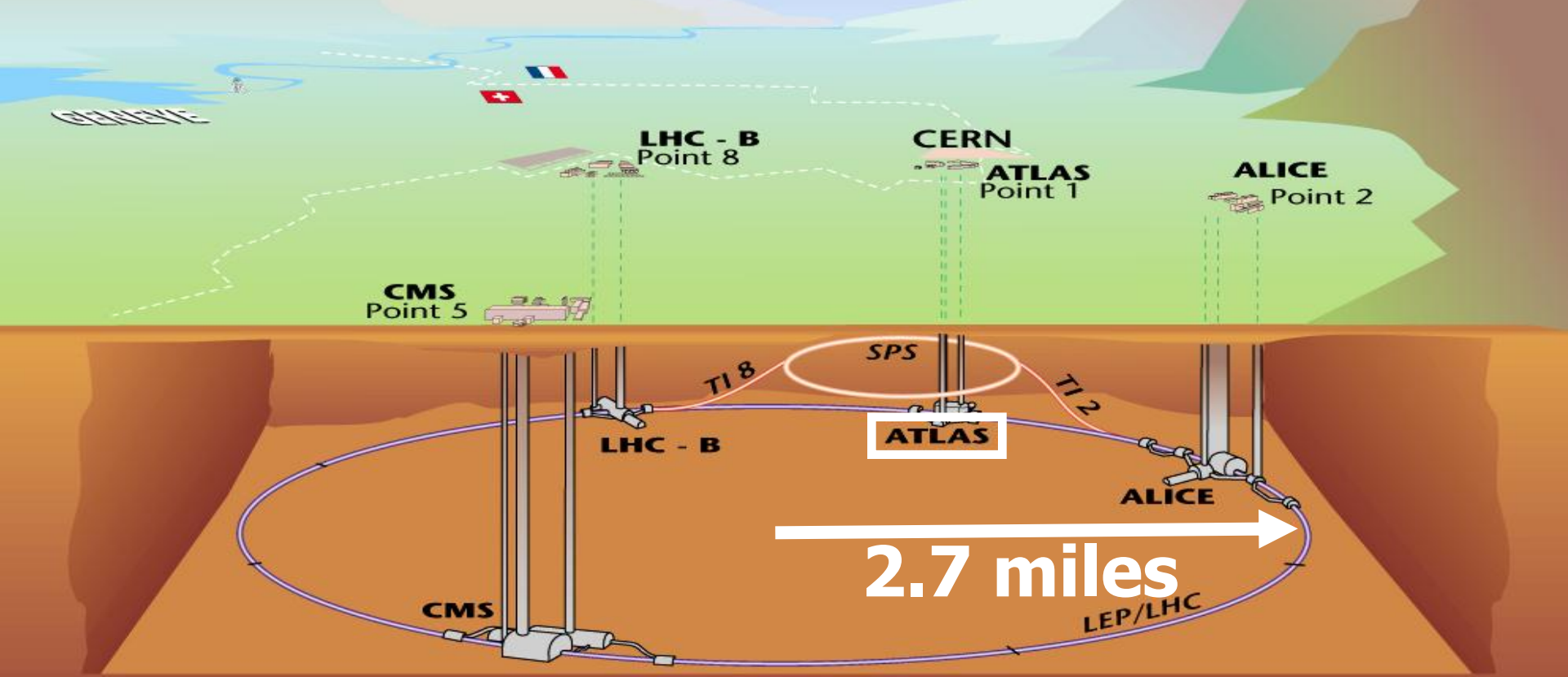




LHC and ATLAS



**\$10 billion dollar, start collision in 2009.
THE energy frontier until at least 2030**



Large Hadron Collider

Photothèque - E540 - V10/09/97



ATLAS Institutions



~3000 physicists, ~200 institutions, 38 countries

~500 US physicists from ~50 US institutions

- **International/national labs: CERN, INFN, LAL, DESY, KEK, ...; US (ANL, BNL, LBNL and SLAC)**
- **Research Universities: Cambridge, Oxford, U. Tokyo, ...; US (Chicago, Columbia, Harvard, MIT, Michigan, Yale, UC-Berkeley, UW, etc.)**

We were admitted to ATLAS in 2007, the only CSU campus on ATLAS experiment Consortium: Bakersfield, Chico, DH, Humboldt, LA, LB, Pomona, Sac State, SB, SF, Stanislaus



ATLAS at Fresno State



Faculty: Yongsheng Gao, Cui Lin (CS)

**Postdocs: Harinder Bawa & Andrew Lowe
(both are stationed at CERN)**

Students: 6 graduate & undergraduate

- **New Physics searches and new tools for NP searches: Bawa/Gao/Lowe's talks at ATLAS Higgs, SM, e/γ , Exotics, Jet/Etmiss, Tau WG meetings since 2006**
- **Significance Calculation and a New Method to Search for New Physics at LHC" by Y. Gao, L. Lu & X. Wang; European Physical Journal C45, 659 (2006)**

Supported by \$145K (CSM), \$200K (Provost and ORSP), \$15K/year (CSM), ~\$10K/year (IRA), etc.



External Funding Received



- DOE and NSF pay our annual membership fee to CERN (~\$17,000 per US physicist per year) since 2007
- \$460K NSF EPP base/core grant (9/2009 to 7/2012). Covers Dr. Bawa and Gao (salary, travel, etc.)
- NSF EPP: Chicago, Columbia, Cornell, Johns Hopkins, Michigan, Stanford, UCLA, UCSD, Washington, Yale, ...
- Typical 3-year EPP grant: >\$1M and over 20 years
- 3/2010: Received 2-year \$620K NSF MRI grant for joint proposal by all 9 NSF EPP institutions on ATLAS. Fresno State: Only lead institution with other 8 (Chicago, Columbia, Hampton, MSU, NIU, NYU, Stony Brook, Washington) as subcontractors.



CSU Fresno Tier 3 Cluster



**Fresno State ATLAS Tier 3 Cluster (136 cores, 108 TB)
in operation for ATLAS physics analyses since 4/2011**

**Dr. Cui Lin (new CS faculty) is joining ATLAS and is
leading our new ATLAS Cloud computing effort (1st US
ATLAS Tier 3 on Cloud) with Chinese CS collaborators**



CSU Students at CERN

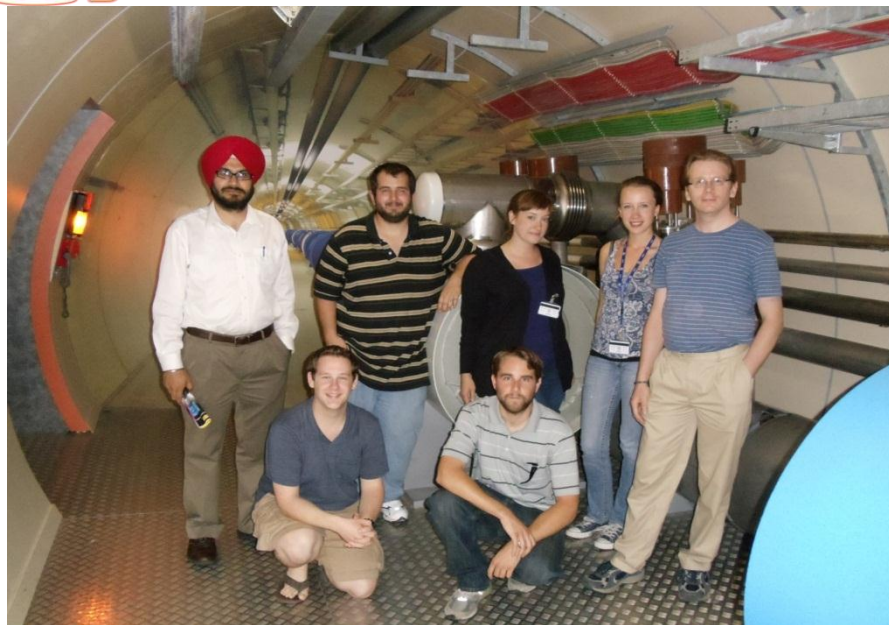


- 20 students (Fresno: 14, LB: 2, Pomona: 2, Sac: 2) have worked at CERN with our ATLAS program since 2008
- Projects: detector monitoring, testing, upgrade R&D, software, grid computing, search for new physics, etc.
- Funded by CSM (\$15K/yr), IRA (~\$10K/yr), FSSR, etc. Reported by Fresno Bee, Channel 30 News, etc.





CSU at CERN in 2010, 2011



Charlie Young (SLAC): James MacDougall is the best summer student we have ever worked with, including those from SLAC and Stanford.

Sarah McGovern (Long Beach) received \$7,650 from NSF Office of International Science and Engineering (OISE)

<http://zimmer.csufresno.edu/~yogao/ATLAS/>



Summary



- **Exciting & promising ATLAS program at LHC, high profile research for next 20 years at LHC and CERN**
- **Strong internal (\$145K (CSM), \$200K (Provost, ORSP), \$15K/year (CSM), ~\$10K/year (IRA), FSSR, ... etc.) and external (\$460K NSF EPP, \$620K NSF MRI) at CSUF**
- **CSU Consortium with 12 campuses, new collaboration with UC, new effort in ATLAS Cloud computing with CS faculty and Ph.D students from Chinese universities**
- **Foundation towards a fully NSF funded, sustainable, and well-established HEP program which can benefit CSU campuses for many years to come**



Needs for the Future



- **External/internal funding for CSU consortium students to work at CERN during summer (IRES or REU)**
- **Online HEP/Computing courses for CSU students before they work on their research projects at CERN**
- **Effective supervision/help for increasing number of CSU students while they live and work at CERN**
- **External funding for HEP consortium faculty to work on ATLAS/LHC research (physics, computing, etc.)**
- **Assigned time for HEP consortium faculty to recruit, supervise students, teach online courses, and work on proposals for external funding, etc.**