



A New US-CERN Summer Program on ATLAS Experiment of LHC at CERN for California State University (CSU) System

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California State University

- Largest university system in the US
- 23 campuses with ~450,000 students
- Very large (~50%) first-generation college student and minority student populations

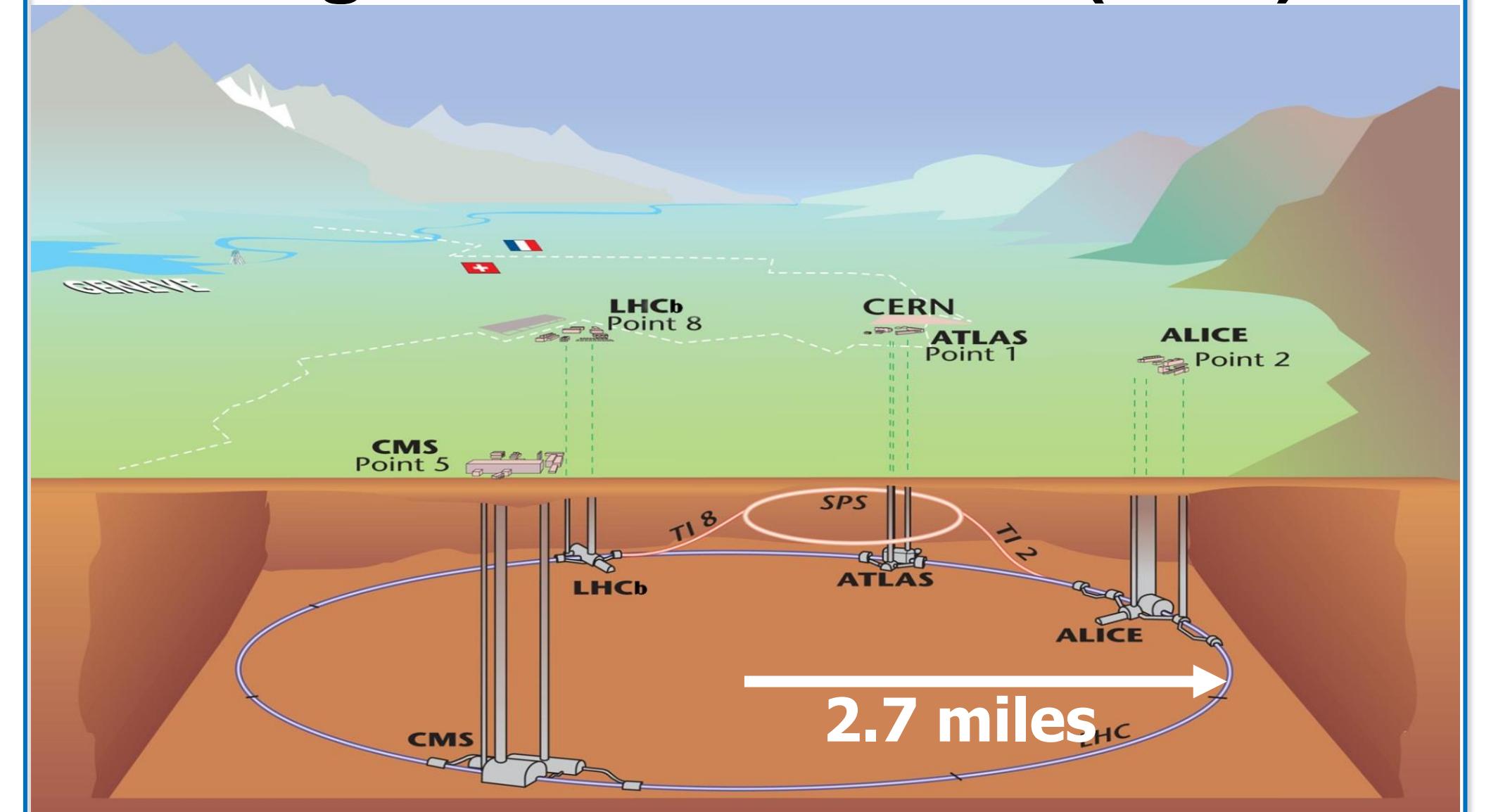


CERN

- CERN (European Organization for Nuclear Research in French)
- ~10,000 scientists from ~100 countries
- Birth place of Nobel Prizes, World Wide Web

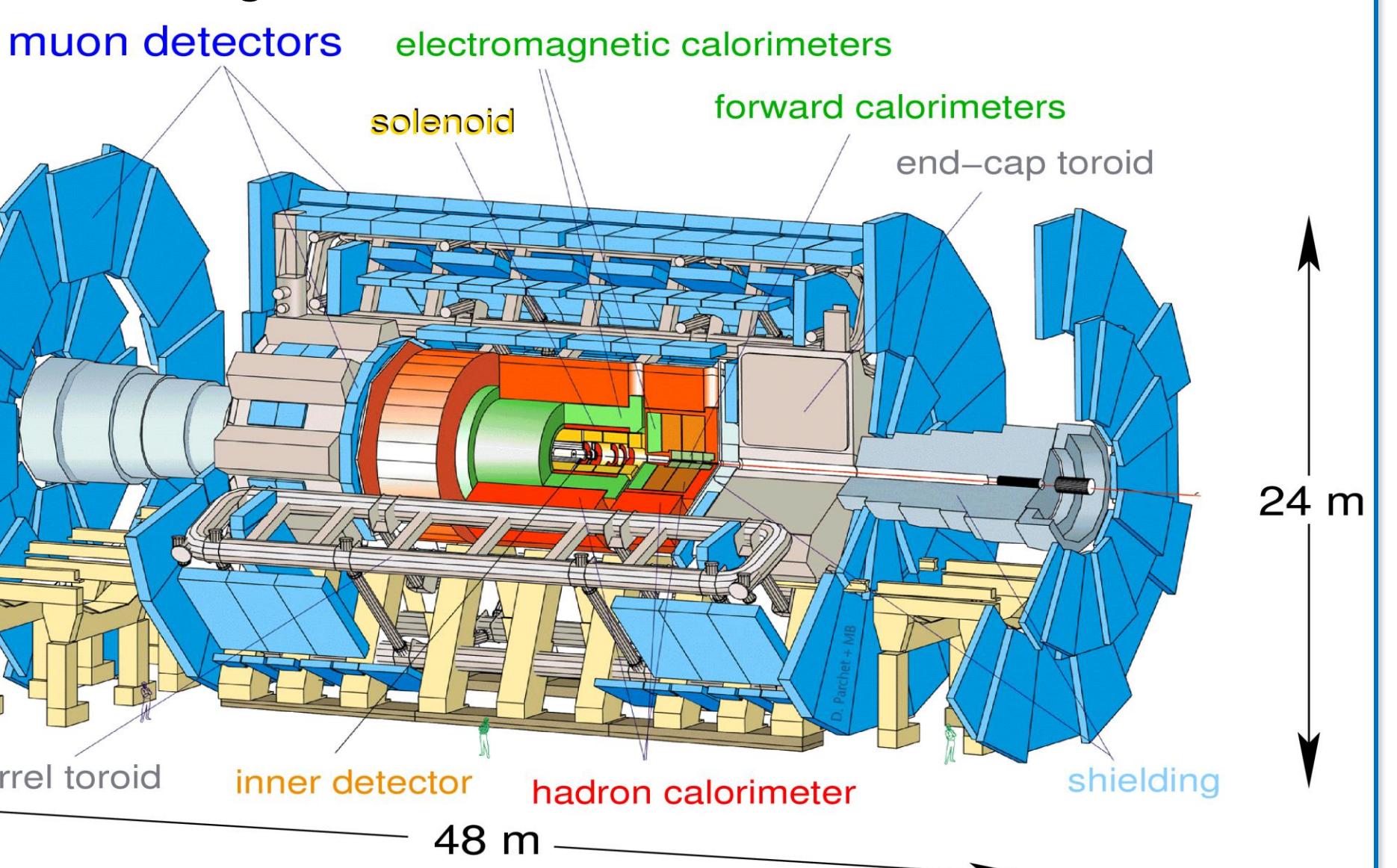


Large Hadron Collider (LHC)



ATLAS Detector

- Largest particle detector ever built
- > \$1 Billion (~\$250M from US DOE/NSF)
- Taking data since 2009

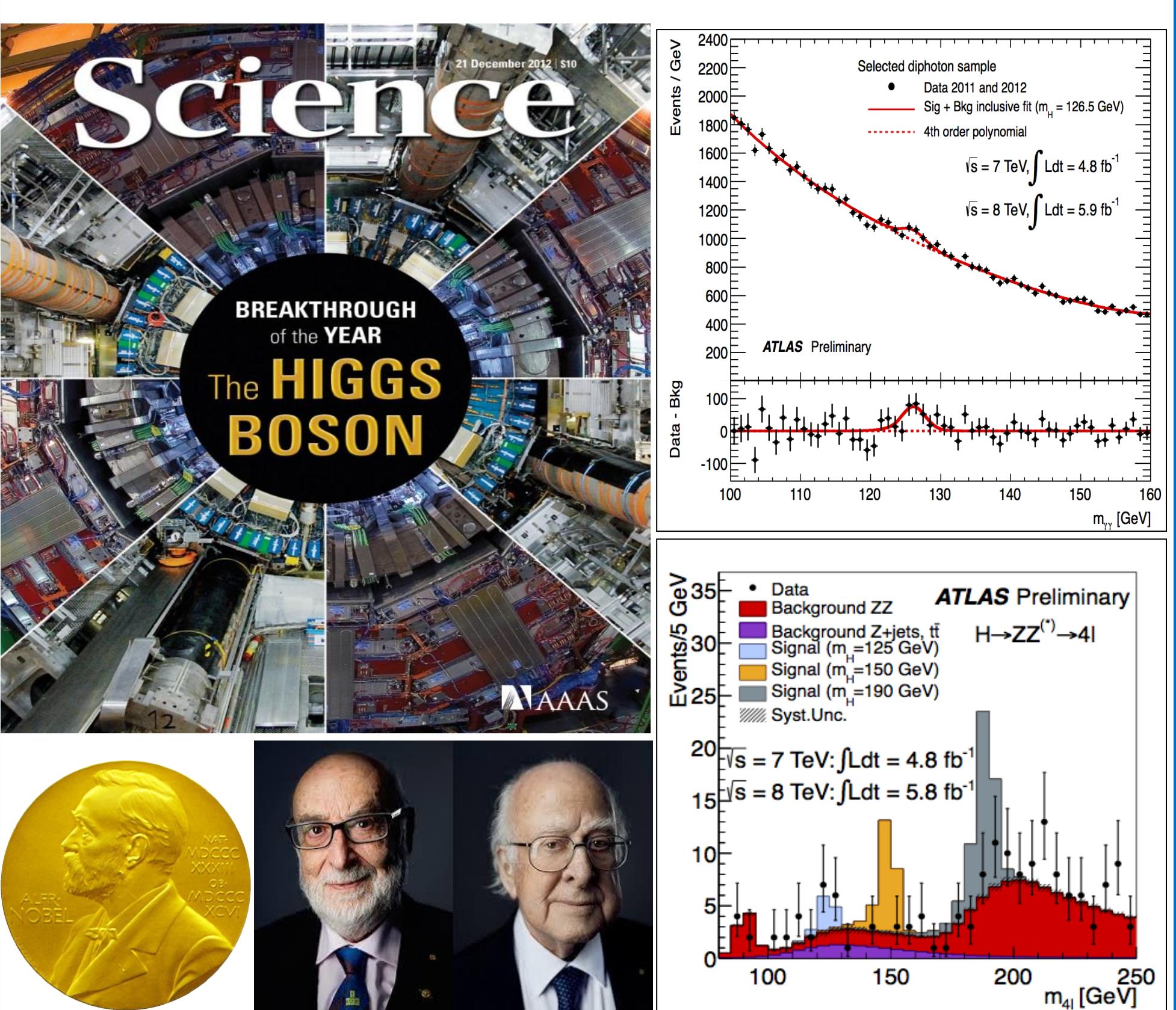


ATLAS Collaboration

- ~3000 physicists from ~220 institutions of 40 countries all over the world
- ~500 physicists from ~40 US universities (Harvard, Yale, MIT, Chicago, Columbia, UC-Berkeley, Michigan, Stanford, UPenn, Washington, Wisconsin, etc.) and 4 US national labs (ANL, BNL, LBL, and SLAC)
- CSU Fresno is the only CSU campus on ATLAS or CMS experiments**

Discovery of Higgs (“God” particle) by ATLAS/CMS

- 2012 “Breakthrough of the Year” by Science magazine
- Resulted in award of 2013 Nobel Physics Prize to the Higgs theory
- CSU Fresno: Only CSU campus involved in the Higgs discovery, only research a CSU is ever involved in which has resulted in a Nobel Prize**



CSU Fresno ATLAS Program

- Faculty/PI: Prof. Yongsheng Gao (2007 to present)
- Postdocs: Dr. Harinder Bawa (2008 to present) and Dr. Andrew Lowe (2010 to 2012)
- ~12 graduate & undergraduate students
- Strong support from CSU Fresno Provost, College of Science & Mathematics, Office of Research & Sponsored Programs, Physics Dept., Associated Students, Inc., etc.
- \$460K NSF Elementary Particle Physics (EPP) core grant (2009 to 2012): First ever such grant to a CSU campus.
- \$620K NSF Major Research Instrumentation (MRI) grant (2010 to 2012): CSU Fresno (Lead) with 8 subcontractors: U. of Chicago, Columbia, Hampton, Michigan State, Northern Illinois, New York, Stony Brook, and Washington
- \$511K NSF EPP core grant (2012 to 2015)
- \$510K NSF EPP core grant (2015 to 2018)
- ~\$250K NSF International Research Experience for Students (IRES) grant (8/1/2015 to 7/31/2018)**
- Reported by ABC-30, CBS-47, KSEE-24, Fresno Bee, etc.
- Center of **CSU Nuclear and Particle Physics Consortium (NUPAC)** which already consists of 17 CSU campuses: Bakersfield, Channel Islands, Chico, Dominguez Hills, East Bay, Fresno, Humboldt, Los Angeles, Long Beach, Northridge, Pomona, Sacramento, San Bernardino, San Francisco, San Luis Obispo, Sonoma, and Stanislaus
- CSU Chancellor's Office hosted meeting at the Chancellor's Office on 5/23/2014 about forming a new official CSU-wide affinity group in physics & astronomy with CSU Fresno ATLAS program and CSU NUPAC as key components. All CSU NUPAC campuses were invited and supportive.
- With approval from CERN/ATLAS in 2015, the “CSU Fresno ATLAS program” at CERN was changed to “**CSU ATLAS program**” with the joining of new ATLAS faculty Dr. Joshua Moss at CSU Sacramento in 2014. CSU Fresno and Dr. Gao remain the home institution and team leader with Dr. Moss as deputy team leader of the CSU ATLAS program.
- Web Page: <http://zimmer.csufresno.edu/~yogao/ATLAS/>
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CSU Students at CERN during Summer

Year	Number of CSU students and their campuses
2016	12 (Fresno: 6; Channel Islands: 1; Humboldt: 1; Los Angeles: 1; Sacramento: 2; Sonoma: 1)
2015	7 (Fresno: 5; Channel Islands: 2)
2014	7 (Fresno: 5; Channel Islands: 2)
2013	6 (Fresno: 3; Channel Islands: 3)
2012	5 (Fresno: 5)
2011	6 (Fresno: 4; Pomona: 2)
2010	5 (Fresno: 2; Long Beach: 2; Sacramento: 1)
2009	5 (Fresno: 4; Sacramento: 1)
2008	5 (Fresno: 5)

CSU Students at CERN



Summary

- 5 to 12 students from CSU NUPAC campuses worked at CERN each summer on ATLAS research
- Worked with ATLAS collaborators from **Stanford** (**Lauren Tompkins**, Nikolina Ilic, Zhihao Jiang), UC-Irvine (Daniel Whiteson, Andrew Nelson), CERN (Alexander Oh, Brian Petersen, Tancredi Carli, Wainer Vandelli), INFN (Alberto, Annovi), ...
- Reported results at ATLAS Working Group meetings, regional/national conferences, attended famous CERN Summer Student Lecture Series
- Took online class with CSU Fresno and tutorial with ATLAS collaborators (**Stanford**, UC-Irvine)
- Admitted to Ph.D programs (UC-Berkeley, UCSD, UCSC, Iowa, Hamburg, CEA Saclay, HEPHY Vienna, etc.), high-tech companies, teaching, ...
- ATLAS/CERN working experience prepares CSU students for their personal and professional success in an increasingly competitive, global, and multi-cultural society**