Physics and Astronomy Dept. Present &Future

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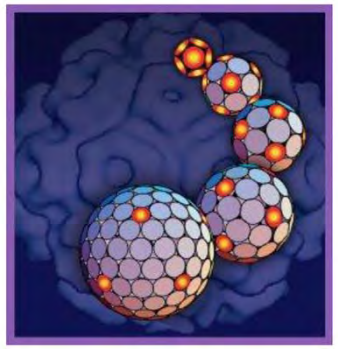
UNIVERSITY OF CALIFORNIA, RIVERSIDE

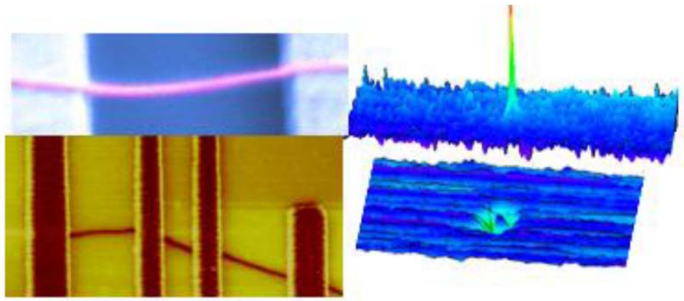
Outstanding Faculty

- 28 Faculty (3rd largest in CNAS), 30 in F 2011
  - Junior Faculty Awards
    - 5 NSF Career
    - 3 DOE Young Investigator
    - 2 Office of Naval Research Young Investigator
    - 1 Sloan
  - Senior Awards
    - 7 American Physical Society Fellows
    - 3 AAAS
    - 1 Guggenheim, 1 Humboldt
    - 1 APS Panofsky Prize

Condensed Matter Physics

- 15 faculty
  - Control and predict the properties of materials
  - Study new classes of materials
    - New electronic materials
    - Biological molecules
    - Antimatter
  - Synthesize, construct, or nanopattern new materials for different applications
    - High speed electronics
    - Energy efficient materials
    - Materials with new functionality





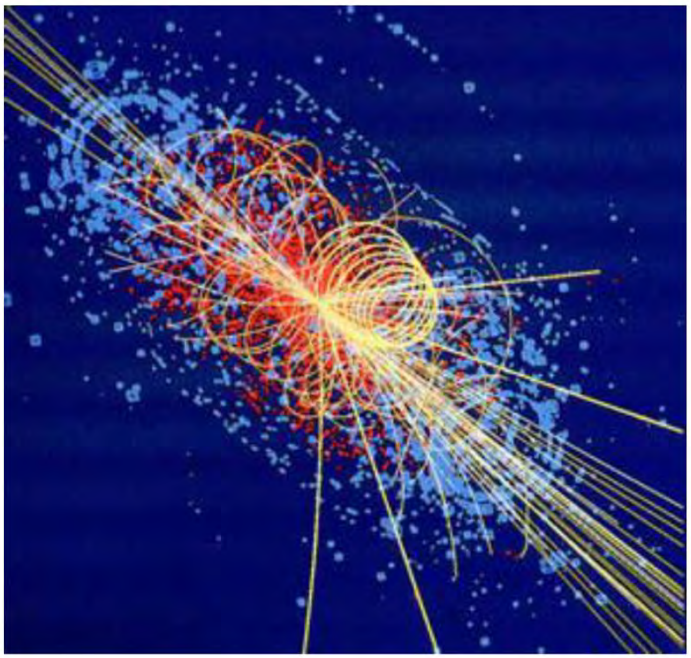
Condensed Matter Physics

- Experimental Research is mostly on site
  - Experimentalists have large groups, 4-8 graduate students, 1-2 postdocs
  - Some large scale user facilities are off-site
- Theory applied to understand and predict new behavior in materials
  - 2 students and 2 postdocs
- Graduate students have many job options: Physics, Applied Physics, Engineering

UCR Advantage

- Collaboration in Department
- Collaboration across CNAS and COE
  - Nanoscale Physics with Engineering, Chemistry
  - Biophysics with Molecular Bio, Cell Bio, Bioengineering, future Med School
  - Atomic and Laser Physics, in department
- Critical Mass
  - Competing for National Centers of Excellence

High Energy Physics



- 10 faculty
- Physics of subatomic particles and fundamental forces
- Nature of mass and energy (search for Higgs Boson)
- Candidates for Dark Matter
- Recreate high energy/density of matter in Big Bang

High Energy Physics

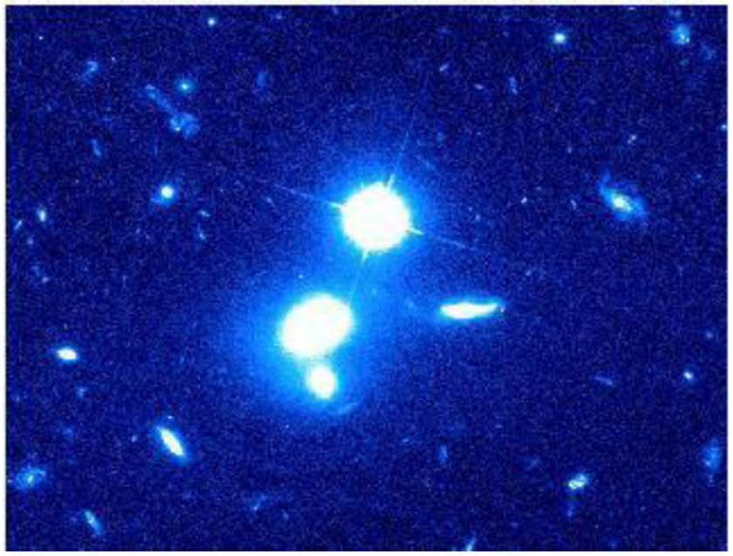
- Experiments performed at large scale accelerator facilities
- Collaborative teams 500-2000 people, 30-70 institutions
- Experimentalists engaged in hardware, software, and data analysis projects

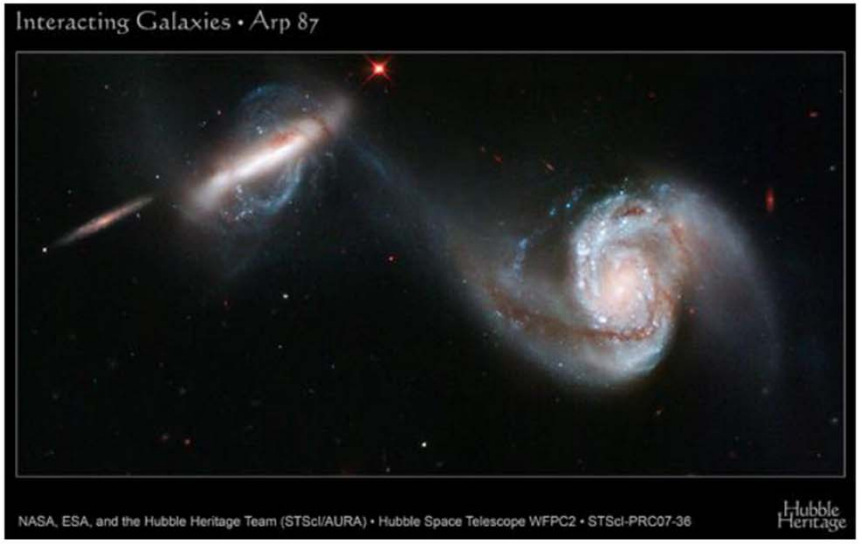
UCR Advantage

- Founder (1 of 10) of CMS (Compact Muon Solenoid) experiment (1 of 3 at LHC, CERN)
- Lead on Endcap detector on CMS
- Co-Spokesman on PHENIX collaboration at RHIC, Brookhaven

Astronomy

- 3 faculty: emphasis on cosmology and galaxy formation in the Early Universe (i.e., 12 billions years ago)
  - Dark Energy and Dark Matter
  - Different Laws of Physics in the Early Universe





Astronomy

- Experiments are performed at telescope facilities around the world (space and land)
- Faculty apply for observation time on telescope
- Data is analyzed on computer: teams of 1-10 collaborators
- Coordination of telescopes in collaboration of ~5-50 investigators

UCR Advantage

- UC Telescopes
  - Keck, world's best land-based telescopes (future TMT)
  - UC Santa Cruz, Institute for Adaptive Optics
- Southern California
  - 1/3 of astronomers in the world work in So. Cal.
    - JPL NASA and other observatory science centers

Other Researchers

- 2 research active emeriti
- 1 teaching active emeriti
- >30 professional or postdoctoral researchers

Graduate Program

- Graduate curriculum: UCR offers 34 graduate courses (many in alternate years) vs 37 at UCLA
- 118 Graduate Students and Growing
- 85% domestic students are out of state
- Domestic (45%): Foreign (55%)
- 4.2 grad students/faculty second highest in UC, <UCB
- US News Graduate Program Rank 2010: 52/187
- NRC 2010 (2006 data): 49/161 Overall, 35/161 Research, 19/161 Diversity
- 100% placement, 82% in research

UCR- 18 Ph.D.'s in 2010-11 and pipelines for >15 from now on!

Departments averaging 15 or more physics PhD degrees per year, classes 2005 through 2007.

	Annual Average		Annual Average
MA Inst of Technology	37	U of Chicago (IL)	20
U of Illinois, Urbana-Champaign	36	U of Michigan, Ann Arbor	20
U of California, Berkeley	33	U of Florida	19
U of Maryland, College Park	31	Michigan State U	18
U of Texas, Austin	26	Princeton U (NJ)	17
Cornell U (NY)	24	U of Minn, Minneapolis	17
Stanford U (CA)	23	Columbia U (NY)	16
SUNY Stony Brook U (NY)	23	Ohio State U	16
U of Wisconsin, Madison	23	U of California, Los Angeles	16
CA Inst of Technology	22	U of Washington	16
U of California, Santa Barbara	22	Rutgers U, New Brunswick (NJ)	15
U of Colorado, Boulder	22	U of Rochester	15
Stanford U – Applied (CA)	20		

Note: List includes only those departments who contributed degree data for all 3 years.

http://www.aip.org/statistics

Undergraduate Program

- Undergraduate Program
  - 102 Undergraduate Majors and Growing
  - 50% graduates participate in undergraduate research
    - Undergraduate Research Successes
      - 3/10 Science Circle UG Research Awards each year

UG Program

- Phys 39
  - Freshman seminar on careers and research opportunities
- Phys 142L
  - Capstone senior laboratory experience
- Phys 41ABC
  - New freshman double course-credit intensive introductory physics for majors taught by faculty
  - Freshman retention increase from 33 to 80%

Diversify training and career paths with 5 degree tracks

- BA Physics
- BS Physics: Standard
- BS Physics: Applied Physics and Engineering
- BS Physics: Biophysics
- BS Physics: Education

Increasing Enrollment

- Goal to increase from 14 BS to > 20
- Freshman 22
- Other majors ~5
- Junior Transfers 14

PhD-granting departments averaging 20 or more physics bachelor's degrees per year, classes 2005 through 2007.

	Annual Average		Annual Average
Mass. Inst. of Technology	82	Carnegie Mellon U (PA)	31
U of California, Berkeley	75	Cornell U-Applied (NY)	30
U of Washington	66	Purdue U, West Lafayette (PA)	30
Brigham Young U (UT)	55	Rensselaer Polytech Inst. (NY)	30
Colorado School of Mines	51	U of MN, Minneapolis	30
U of IL, Urbana/Champaign	49	U of California, Davis-Applied	29
U of California, Los Angeles	47	U of Florida	29
U of Maryland, College Park	42	U of California, Davis	28
U of California, San Diego	40	U of California, Santa Barbara	28
U of Colorado, Boulder	39	U of California, Santa Cruz	28
Ohio State U	37	Michigan State U	27
U of Michigan, Ann Arbor	37	Stanford U (CA)	27
U of Virginia	37	Yale U (CT)	26
U of Arizona	36	Princeton U (NJ)	24
Rutgers U, New Brunswick (NJ)	35	Columbia U (NY)	23
Cornell U (NY)	34	U of California, Irvine	23
Pennsylvania State U	34	Boston U (MA)	21
U of Texas, Austin	34	College of William & Mary (VA)	21
U of Wisconsin, Madison	34	Florida State U	21
California Inst. of Technology	33	U of MA, Amherst	21
U of Chicago (IL)	33	U of Rochester (NY)	20
U of Utah	33		

Note: List includes only those departments who contributed degree data for all 3 years.

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Public Service

- Outreach
  - Summer Academy for HS teachers
  - Public Open Houses
  - Engagement with High Schools to increase IE Physics participation
    - 33% HS grads take physics nationally
    - 22% CA statewide average, 11% IE
  - Faculty engaged in many volunteer activities
    - Science Fairs, Science Olympiad
    - Astronomy Society
    - Schools

It’s been a fantastic 50 years

- Stay tuned
- Keep in touch
  - Interact with students Phys 39, SPS
  - Internships, summer work opportunities
  - Volunteer to teach
  - Donations welcome
    - UG research stipends
    - Graduate student support
    - Lab equipment for instruction and research
  - Industrial contacts (materials/electronics)
  - Recruit students for UCR