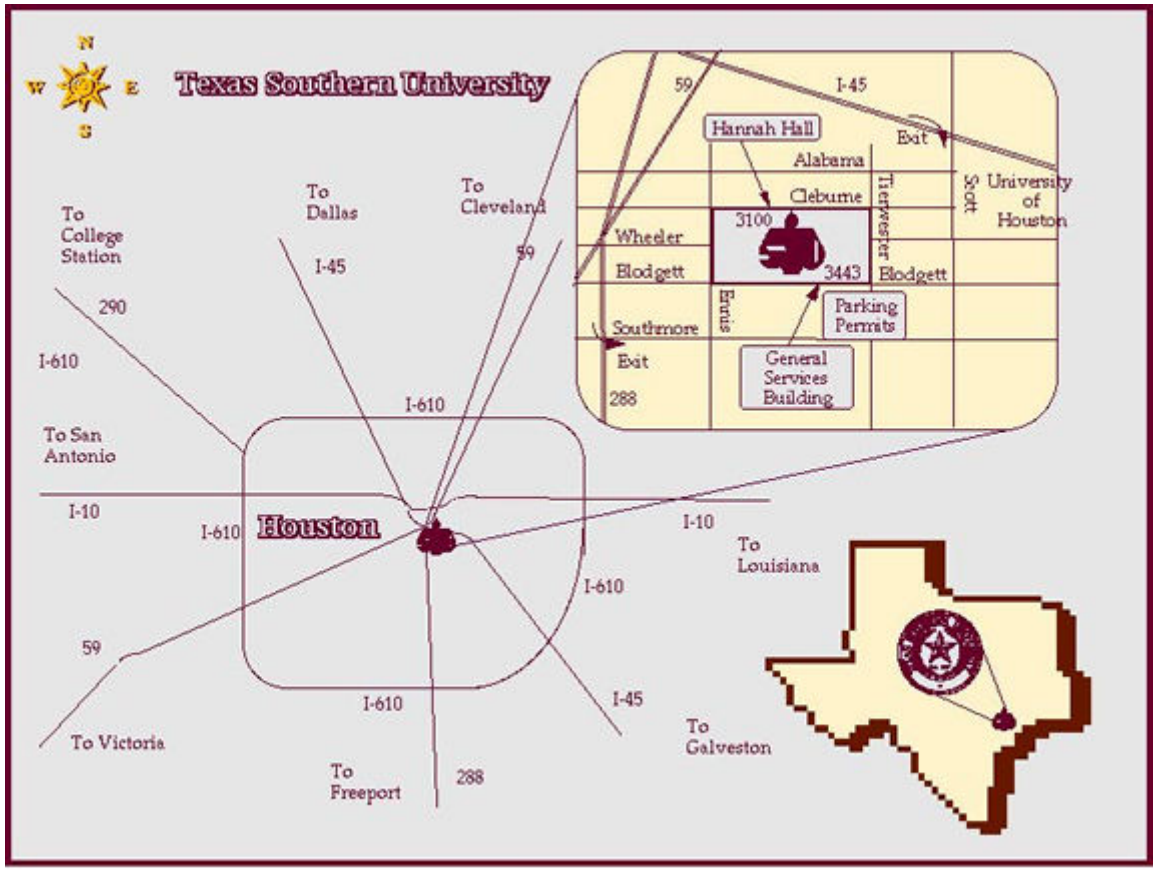
SPIN-UP workshop at the University of Texas at Austin, May 4-6, 2012

Department of Physics

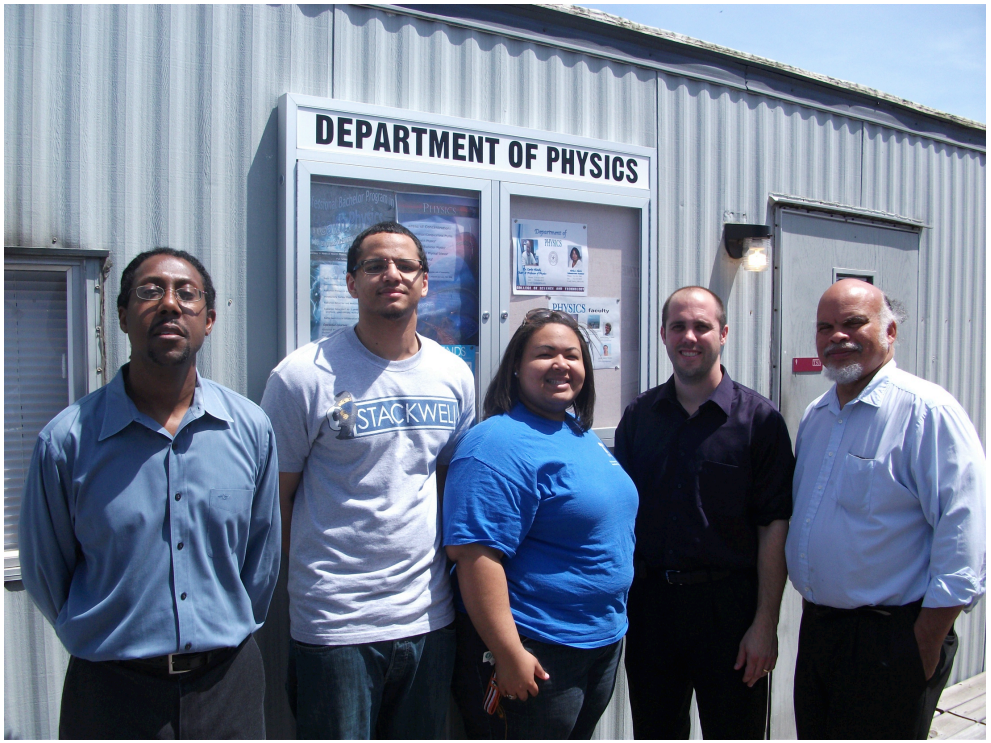


- before 2004 – physics degree offered by Department of Computer Science and Physics
- 2004 – Department of Physics spins-off CS by hiring C. R. Handy (no physics majors at that moment)
- Problems/Challenges:
  - Inefficient curriculum with triplicate undergraduate courses encumbering manpower resources preventing sufficient faculty to teach upper level courses
  - Delayed immersion into physics, preventing students from participating in summer enrichment opportunities until end of junior year
  - Very few research/scholarship driven faculty
  - Lack of attractive/engaging/modern tracks

History - 2

- 2006 - 2011 - Hired new research oriented faculty
- 2007- Through NRC support created only Health Physics track in Houston
- 2008 - Revised the entire curriculum (100+ courses), emphasizing immersion in physics by freshman year; making courses interleaving and mutually supporting; greater focus on elevating advanced math competency by end of sophomore year.
- 2009 - Expanded scholarship opportunities beyond NSF-LSAMP: UT-Austin/ONR scholarship
- 2010 - the first graduates : 40% of Texas Black B.S. Physics graduates
  - Brandon Georgetown – now in Ph.D. program in Environmental Engineering – UH
  - Biruk Desta – finalizing admission into UH – Physics Ph.D. Program

- 2008 – Department moved to trailers after Hurricane Ike damaged Science and Technology Building
- 2011 – Produced One Graduate –
  - Samantha Everett – who is completing her teaching certification as a H.S. physics/math teacher in the Dallas Area
- Fall 2011 – THECB decides to shut down B.S. Physics Degree
- 2012 – Will graduate six; four African American, most likely 50% of State's output



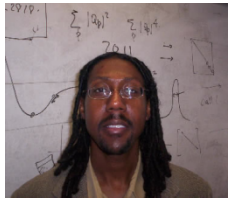
Faculty

Carlos Handy
Professor and Chair
Columbia U

Daniel Bessis
Professor
Sorbonne Paris

C. J. Tymczak
Associate Professor
Texas A&M

Daniel Vrinceanu
Assistant Professor
Georgia Tech



Mark Harvey
Assistant Professor
Hampton University

Luca Perotti
Research Assistant Prof.
U of Milano, Italy

Isabela Vrinceanu
Lab Coordinator
Georgia Tech

Young Lee
Adjunct Professor
U of Houston

Teaching

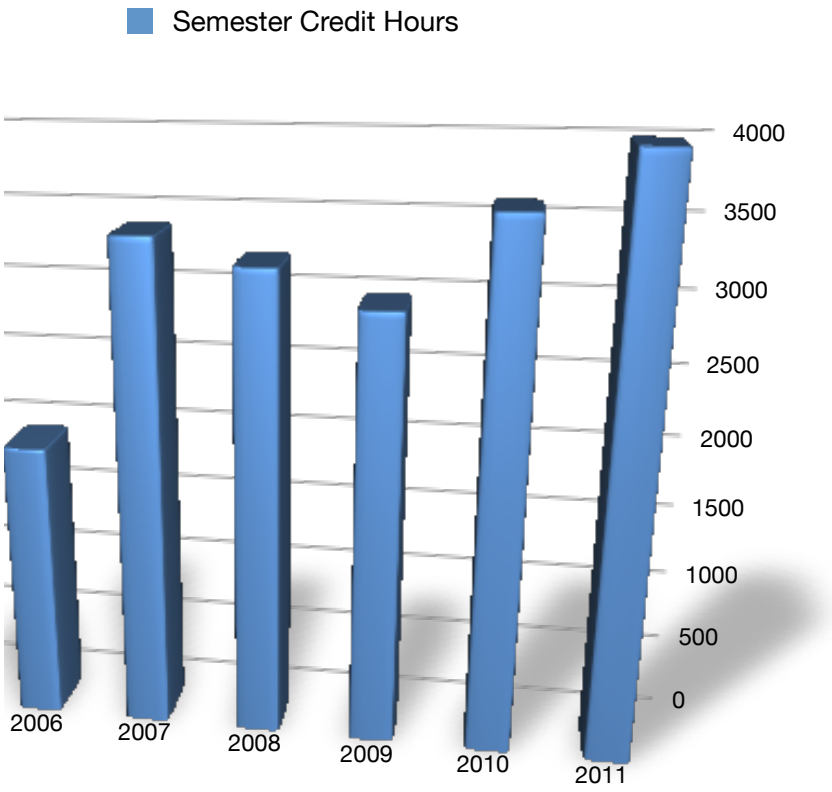
Normal load 12 CR/semester, graduate status faculty 9 CR/semester

- Introductory Physics
- College Physics I
- College Physics II

+

- University Physics
- Physics for Engineers
- Courses for majors

2005	2006	2007	2008	2009	2010	2011
1740	1957	3394	3225	2983	3605	3993



Physics Program

Tracks:

- Health Physics
  (the only one in Houston)
- Computational Physics
- General

Year	Enrolled	Physics Degrees	Post Bacc	Dual degree	Total degree
2008	3	0	0	0	0
2009	10	0	0	0	0
2010	13	0	1	1	2
2011	16	1	0	0	1
2012	14	5	1	0	6
2013	8	3	1	1	5

40% of Black B.S. Physics graduates in Texas in 2010 were produced by TSU

Undergraduate Degrees in Physics

Texas Public Universities

	White	Black	Hispanic	Asian
FY 2005	111	5	22	5
FY 2006	114	3	20	19
FY 2007	119	3	19	6
FY 2008	124	5	19	12
FY 2009	112	3	25	14
FY 2010	130	4(5)	30	15

Success stories

- Samantha Everett – High school science teacher Dallas
- Brandon Georgetown – PhD Program at U of Houston/Env. Eng.
- John Metyko – Health Science officer at UT M. D. Anderson Cancer Center, online graduate M.S. program at UT-Austin
- Micheal Smith – PhD program Health Physics Texas A & M U-College Station
- Hiue Nguyen – Graduate program in Bio-Engineering/USC - California

Research (> 300 published articles)

- C. R. Handy – Mathematical Physics (66 papers)
- D. Bessis – Mathematical Physics, Advanced Signal Processing (118 papers)
- C. J. Tymczak – Quantum Chemistry, Many Body (30 papers)
- D. Vrinceanu – Atomic and Molecular, Computational (50 papers)
- M. Harvey – Nuclear Physics, Health Physics (20 papers)
- L. Perotti – Quantum Chaos, Atomic and Molecular, Advanced Signal Processing (20 papers)

Current and Pending Funding

Agency	Amount	Period	Involvement
Nuclear Regulatory Committee	$900k	2007-2013	PI – health physics curriculum/fac. Develop.
Office of Naval Research	$300k	2009 - 2014	PI – scholarships and outreach
National Science Foundation	$220k	2011 - 2013	PI – MRI High Performance Computing
National Science Foundation	$4.9M	2011 - 2015	Co-PI CREST Center for Research of Complex Networks
NSF and NASA	$500k	2008 - 2013	PI – sub-award from CGWA, UT Brownsville
Welch Foundation	$250k	2008 – 2013	PI – Quantum Chemistry
National Science Foundation	$300k	2012 - 2015	Pi – HBCU-UP Targeted Infusion Project (pending)
National Science Foundation	$1M	2012 - 2015	Pi – HBCU-RISE (pending)

Facilities

Health Physics Laboratory:
Modern nuclear physics equipment

- Gamma spectroscopy detector systems
- Geiger Mueller Counting systems
- Alpha spectrometer system
- Nuclear Instrumentation Modules (NIM)
- Survey Meters (Beta, Gamma, and Neutron Meters)

High Performance Computing Center:

- 28 servers, 288 CPU's, ~ 1TFlop performance
- Capacity will double by 2013 with NSF-MRI funding
- Curriculum and Education activities proposed in 2012

Outreach / Recruitment

Calculus Now for 9th Graders! Program – introducing calculus to junior/high school students via physics concepts

Double majors for Mathematics and Chemistry majors

ROTC students in various COST departments

In order to attract good students to a program you must have :

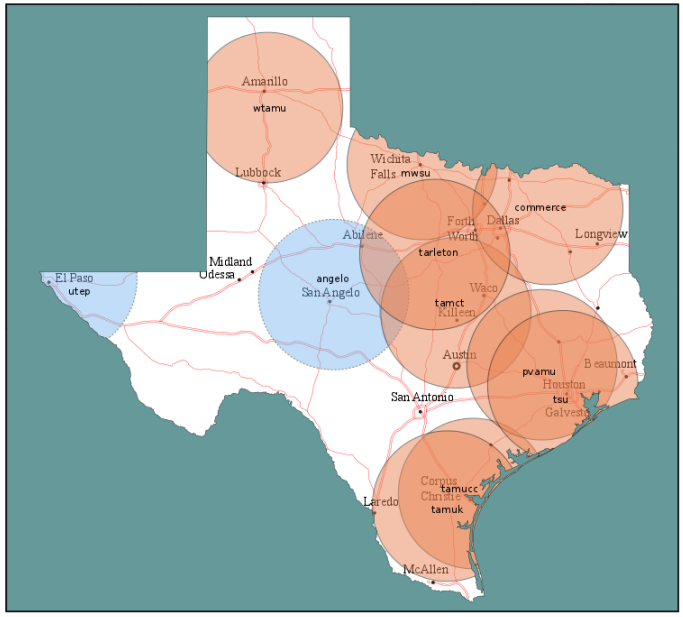
(a) excellent faculty
(b) scholarship monies
(c) a modern/workforce-relevant curriculum
(d) decent logistical resources.

None of these were in place at TSU. The Chair can affect (a), (b) and (c).

Future

Texas Physics Consortium

Comprehensive Partnership
K - 16



Bachelor of Science Degree in Physics
FOUR-YEAR DEGREE IN PHYSICS
GENERAL PHYSICS TRACK
Degree Plan - Total Credits: 120

	First Semester		Second Semester	
First Year	FS 102 Freshman Seminar	1	PHYS 116 University Physics Lab I	1
	MATH 133 Algebra	3	PHYS 152 University Physics I	3
	ENG 131 Freshman English I	3	PHYS 162 Fundamentals of Sci. Programming	3
	CHEM 111, 131 General Chemistry & Lab I	4	ENG 132 Freshman English II	3
	PHYS 101 Principles of Physical Science	4	MATH 241Calculus I	4
	PHYS 151 Computational Modeling of Physical Systems	1	CS 116 Introduction to Comp. Sc.	3
		16 hrs		17 hrs

	Third Semester		Fourth Semester	
Second Year	PHYS 217 University Physics Lab II	1	PHYS 218 University Physics Lab III	1
	PHYS 247 Math Methods I	3	PHYS 248 Math Methods II	3
	PHYS 251 University Physics II	3	PHYS 252 University Physics III	3
	PHYS 271 COMP PHYS I	3	PHYS 272 Mechanics I	3
	MATH 242 Calculus II	4	MATH 243 Calculus III	4
	MATH 250 Linear Algebra	3		
		17 hrs		14 hrs

	Fifth Semester		Sixth Semester	
Third Year	PHYS 332 Modern Physics	3	PHYS 336 Thermodynamics and Stat. Phys.	3
	PHYS 333 Electricity and Magnetism I	3	PHYS 353 Quantum Mechanics I	3
	MATH 251 Diff Equations	3	PHYS 360 Adv. Undergrad Lab	2
	HIST 231 Social & Political History of the United States to 1877	3	POLS 231 American Political Systems I	3
	SC 135 Business & Professional Comm. (Or) SC 136 Public Address	3	Elective	3
		15 hrs		14 hrs

	Seventh Semester		Eighth Semester	
Fourth Year	PHYS 433 Quantum Mechanics II	3	PHYS 412 Senior Seminar	1
	HIST 232 Social & Political History of the United States since 1877	3	PHYS 484 Topics in Physics	3
	MUSIC 131 Introduction to Music (Or) ART 131Drawing and Composition I	3	ENG 2xx Any 200 Level ENG may be selected	3
	ECON 231 Principles of Economics	3	POLS 232 American Political Systems II	3
	Elective	3	Elective	2
		15 hrs		12 hrs