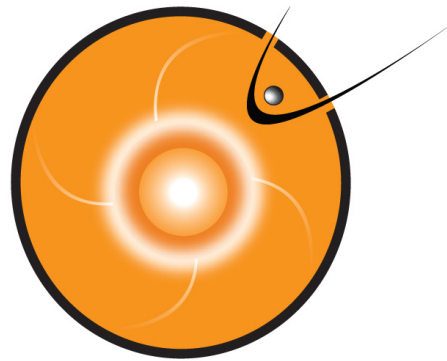
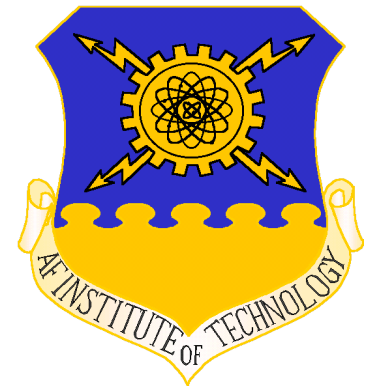




Air Force Institute of Technology



CCMC in University Education



Lt Col Ariel Acebal

Department of Engineering Physics

20 January 2012

The views expressed in this presentation are those of the author and do not reflect the official policy or position of the United States Air Force, the Department of Defense, or the United States Government.



AFIT's Goal



AFIT's goal is to provide defense-focused graduate and professional continuing education and research to sustain the technological supremacy of America's air and space forces.



AFIT Education



- Resident Graduate Education
 - Graduate School of Engineering and Management

- Professional Continuing Education
 - Civil Engineering and Services School
 - School of Systems and Logistics
 - AF Cyberspace Technical Center of Excellence

- Civilian Institution Programs
 - Graduate and Continuing Education
 - Health Care Education



AFIT Departments



- School of Engineering and Management
 - Engineering Physics
 - Electrical & Computer Engineering
 - Aeronautics & Astronautics
 - Systems & Engineering Management
 - Mathematics & Statistics
 - Operational Sciences



Applied Physics Program



- Space Physics track
- Primary mission to educate future space weather officers
 - Breadth of coverage
 - Ops focus to courses & research
 - Faculty field experience
- Also serve cross-over students and civilians
- Students earn an M.S. in Applied Physics



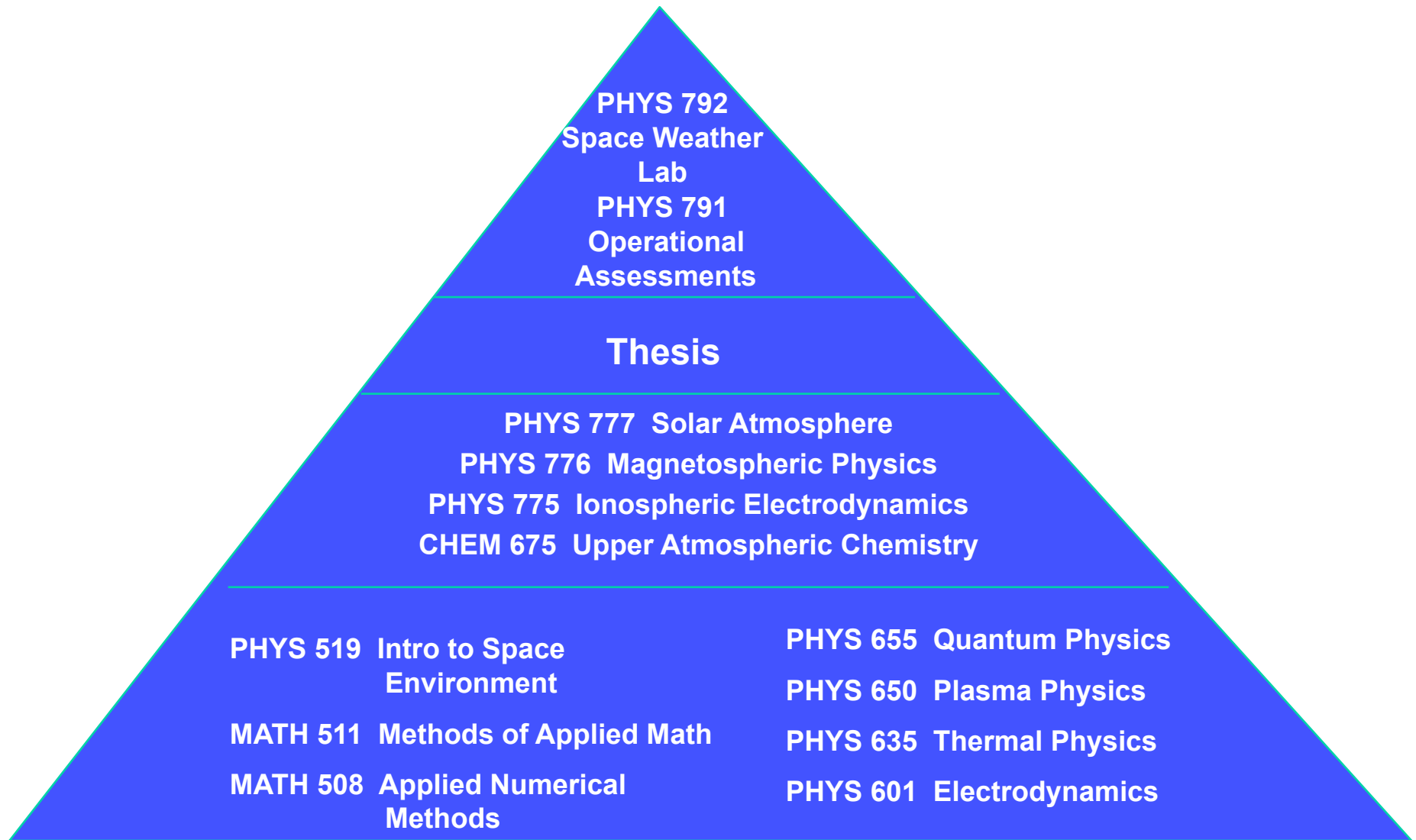
Students



- 18 (or 21) month program
 - 4 week refresher courses – September (May)
 - Math
 - Physics
 - Programming
 - Select topic between 2nd and 3rd quarter (Dec – Feb)
 - 3 - 5 month part-time research (3rd, 4th, 6th quarters)
 - 4 month full-time research (5th quarter)
- Students range from:
 - Just having completed undergraduate degree
 - Flying job for the last 11 years
 - Civilians working for DoD
 - Average 4 years after completing undergraduate
 - Limited E/M, plasma background



Space Physics Curriculum





Space Physics Research



- Small program; leverage external resources
- Recent research performed in collaboration with USU and CCMC
- Traditional research areas
 - Validate computer models
 - Asses sensor location and number
 - Investigate new forecasting techniques for
 - SEP
 - CMEs arrival times



AFIT-CCMC Collaboration



- Three areas for collaboration between CCMC and AFIT
 - Research
 - Lab exercises
 - Courses



Research Collaboration



“Evaluation of Interplanetary Magnetic Field Tracing Models Using Impulsive SEPs”, Brian Elliot, 2010

“Ensemble Forecasting of Coronal Mass Ejections using the WSA-ENLIL with Coned Model”, Dan Emmons, in progress 2012

“Comparative Statistical Analysis of Auroral Oval Models”, Cory Lane, in progress, 2012



Research Collaboration



- Research committee
 - Chairman - AFIT Faculty Member
 - Members – AFIT, CCMC
- Monthly/weekly conference calls
 - Research/model modifications
- Joint thesis defense and grading
- Publishing collaboration
 - MacNeice, Peter; Elliott, Brian; Acebal, Ariel, Validation of community models: 3. Tracing field lines in heliospheric models, Space Weather, Vol. 9, No. 10.



Lab Exercises Collaboration



- Space Weather Lab course
- Goal: Familiarize students with available space weather models and data
- Currently taught using both AF-GEOSpace and CCMC models
- Will be incorporating iSWA based on what I've seen at the workshop



Lab Exercises Collaboration



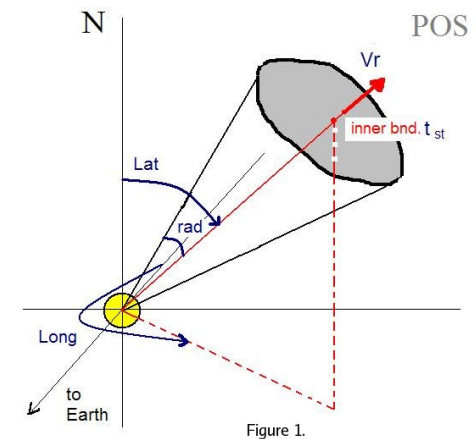
- First Method
 - Lecture: describe model/sensor/data, provide context/background
 - Instructions to familiarize student with required inputs, output, interpretation of results
 - Open-ended exercises
 - Student write-up
- Second Method
 - Student presentation and exercise



Lab Exercises Collaboration



- Strengths
 - Current models
 - Easy access
- Weaknesses
 - Uneven documentation
 - Timeliness of results
- ENLIL with Cone Model; good reference
- Work in progress
 - Trying to incorporate real time simulations





Course Collaboration



- Use models at CCMC to reinforce or explain lecture material
- Replace or augment traditional lectures/homework
 - Similar to magnetosphere modules
- Don't want to just show pretty pictures
- Needs a lot of work/help



Summary



- Research
 - Good collaboration
 - Will continue
- Lab projects
 - Good feedback from the students
 - Work in progress
- Course examples
 - Barely started
 - Good opportunity
 - Will be calling you