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# The view from the ground: Student perspectives and the future of the OFES workforce

Presentation to FESAC MFE Priorities Sub-panel  
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Thanks to the graduate students at:  
MIT, Wisc, UCSD, Princeton, Texas, Washington..  
for input for this talk.

## Outline:

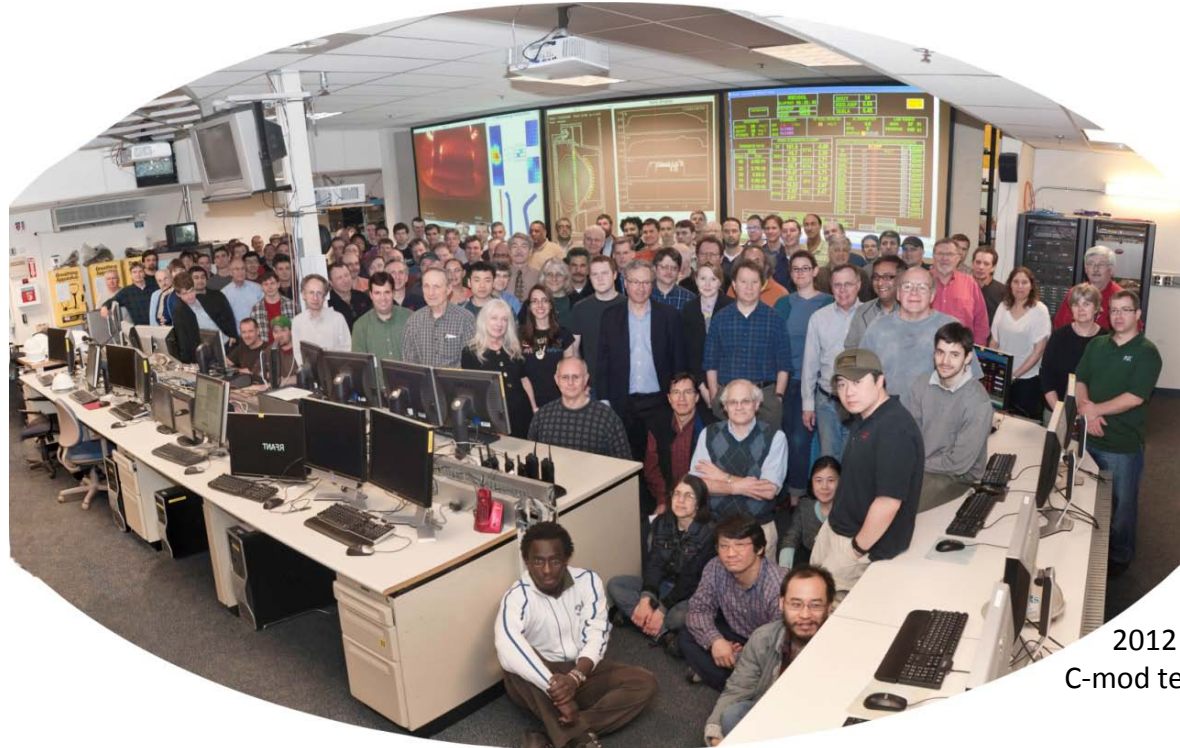
- Student perspectives and concerns
- The health of the university fusion programs
- Workforce development deficiencies

# Students are concerned about program stability and future domestic capabilities.

- FY2013 proposed budget looks like decisions without a plan.
  - Students recognize budgetary constraints, eager for a peer reviewed, consensus, realist plan.
  - Students understand the fusion energy vision, want to know the who, what and when.
- Workforce instability is a deterrent to attracting and retaining talent.
  - Recognize fluctuations in funding is part of science .
  - Even in a restoration the damage is done.
  - Wary of competing against advisors for shrinking positions.
- Desire accessible experimental facilities.
  - Access to facilities a key driver for recruitment and learning.
  - Students worry about training as experiments at universities are dropped, faculty are not replaced and major machine runtime is reduced.
  - Excitement about new directions and priorities in program (i.e. PMI) tempered by seeing little shift in facilities or training.
- International collaboration in lieu of domestic facilities narrows potential applicants
  - Hesitant to join if it meant relocation overseas

**Students worry about programmatic decline, want to stay in field but feel it is risky. Excitement for next steps overshadowed.**

# The health of the university fusion programs needs to be examined.



2012  
C-mod team

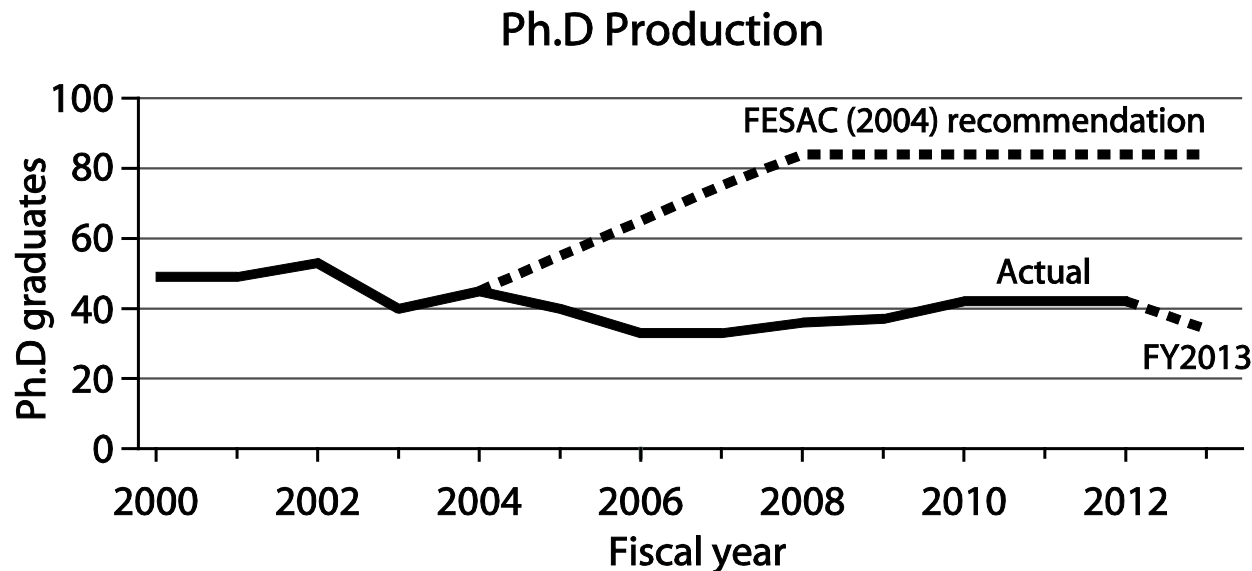
## AT MIT:

- Magnet lab, LDX, C-Mod, VTF. ... soon nothing left.
- PSFC team still intact. But for how long?
  - Where does the accumulated knowledge go after facilities are closed?
- Despite efforts, many students are in a lurch.
  - Quit, transfer, change fields, stick it out?

**Experience similar at other universities. Programs that remain wonder if they'll be cut next.**

# FES program is not on a path to meet previously identified workforce needs.

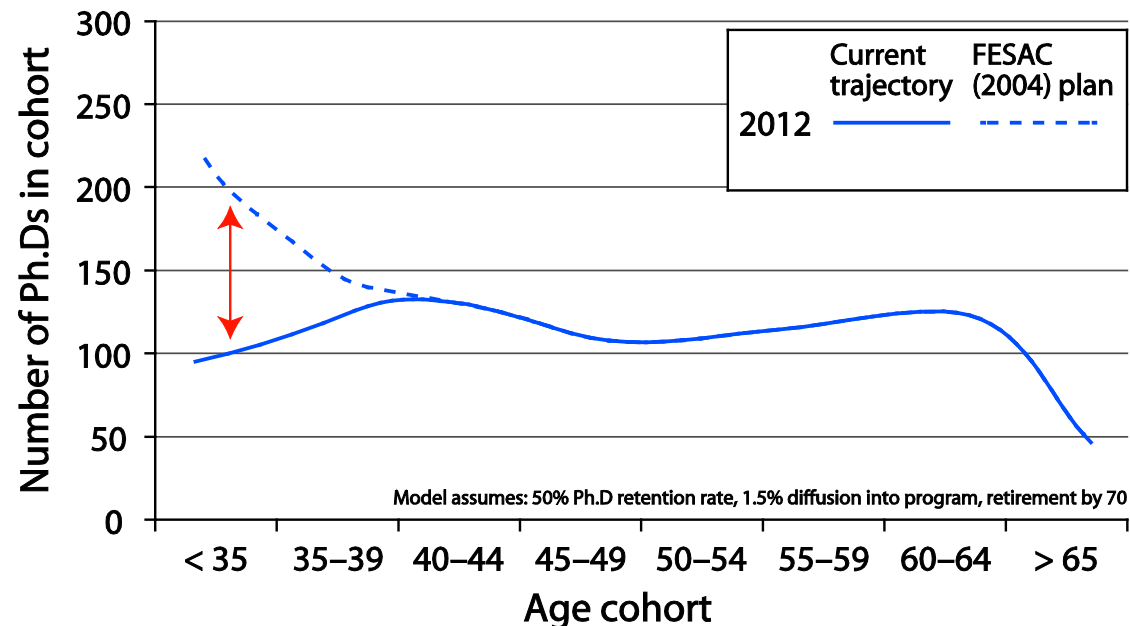
- 2004 FESAC panel compiled workforce needs assuming:
  - Participation in burning plasma experiments (ITER and NIF)
  - Base program at 2004 levels (320M\$ 2012)
  - **Similar to program plan today.**
- Recommended doubling PhD production to replace aging workforce and fill new positions needed to utilize burning plasma experiments
- Plan went unimplemented, workforce not replaced, positions not created.



# Large gaps in the workforce are expected under the current trajectory.

- Used a demographic model, 2004 panel and budget data to estimate current and future workforce demographics
- Compare to projection if program followed 2004 recommendation
- Did not produce the young “wing” of researchers

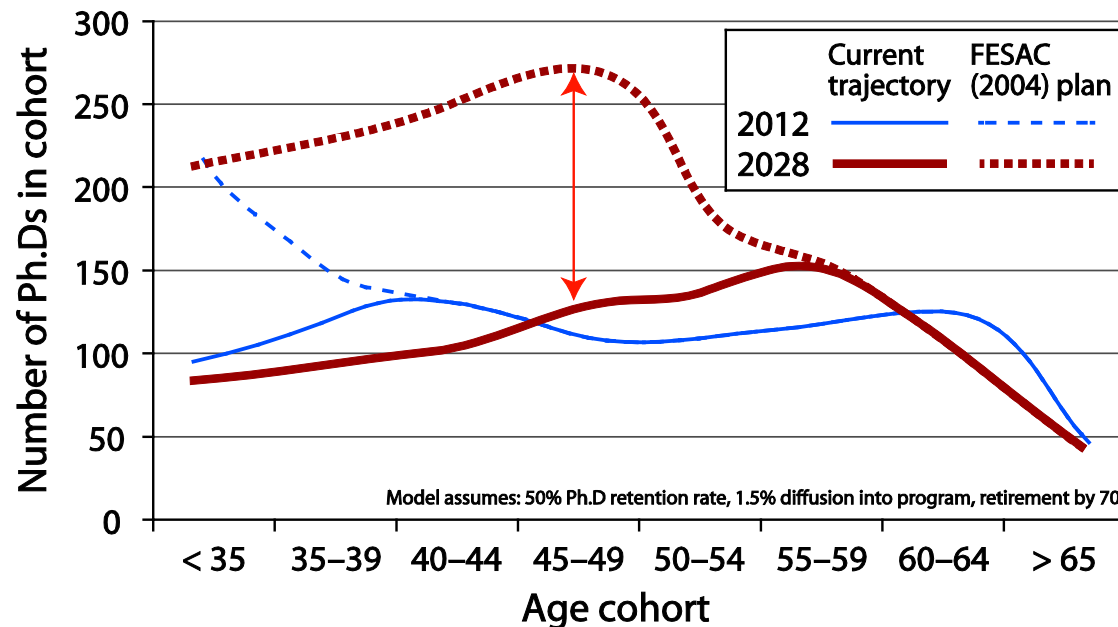
## Fusion demographics



# Large gaps in the workforce are expected under the current trajectory.

- Used a demographic model, 2004 panel and budget data to estimate current and future workforce demographics
- Compare to projection if program followed 2004 recommendation
- Did not produce the young “wing” of researchers
  - Who become the mid career scientists in the late 2020’s
    - Fully utilize ITER, become group leaders
    - Bring knowledge home and prepare for next step device

### Fusion demographics



# Priorities should reflect the importance of the universities and workforce.

- **Decisions now will greatly affect the students**
  - Program needs to attract and retain qualified students in a competitive atmosphere
  - Students desire a realistic, clear plan, prospects for advancement and impact, stability and access to domestic facilities
- **Examine the health of the university fusion programs**
  - Departments are “Canary in the coal mine” for program health
  - Academic departments are important when judged as a science program
  - Universities are the primary driver of the early workforce pipeline, if we lose them it will take decades to get them back
  - If facilities shift to national labs or international collaboration, ensure universities have a viable model for participation
  - Look to other science programs but be mindful of the differences
- **Ensure workforce is accounted for in prioritization**
  - Workforce is different from facilities or scientific milestones
  - The pipeline takes years to develop
  - If a facility is a priority, ensure the program will have the appropriate workforce to utilize it
  - If a facility is a lower priority, account for the impact on the workforce and ensure knowledge transfer

Thank you for the opportunity to contribute.