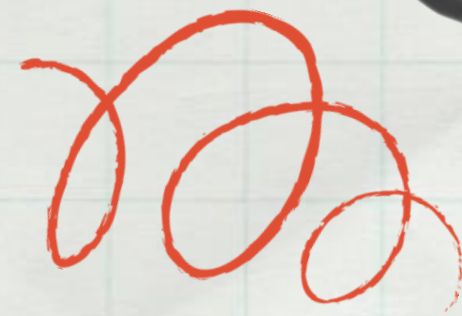
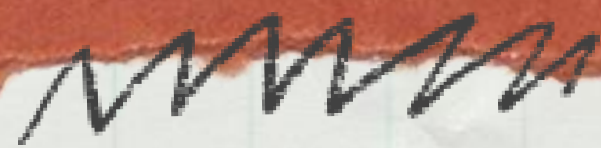


AAPT WINTER MEETING 2022



Shifting Culture

to Support Physics Innovation and
Entrepreneurship Curriculum Implementation

Anne Leak

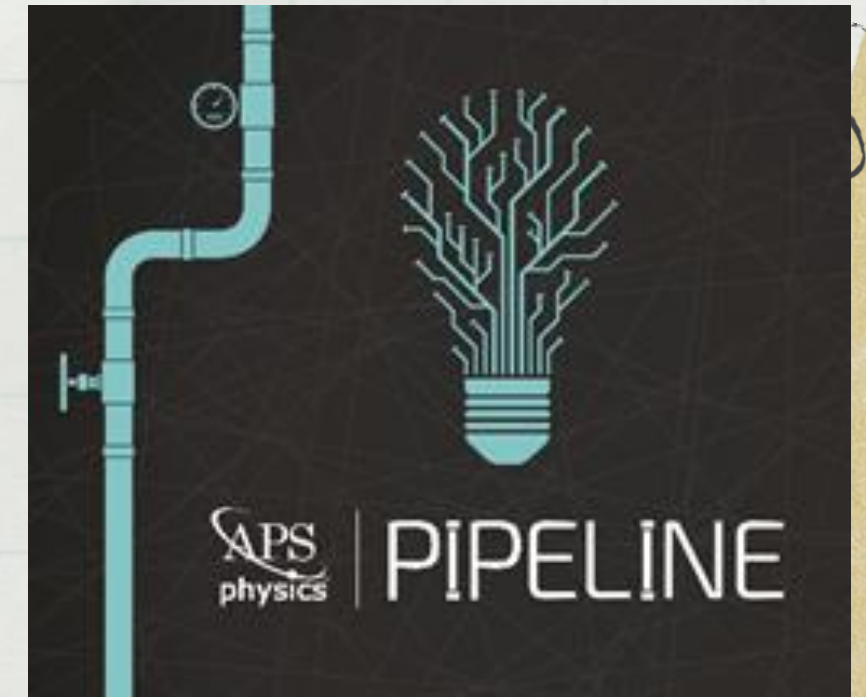


APS PIPELINE Network

- Six member institutions: Loyola University Maryland, Rochester Institute of Technology, Wright State, UC Denver, and George Washington University.
- Advised by experts from established physics entrepreneurship programs (e.g. Carthage College, Case Western, Kettering University)

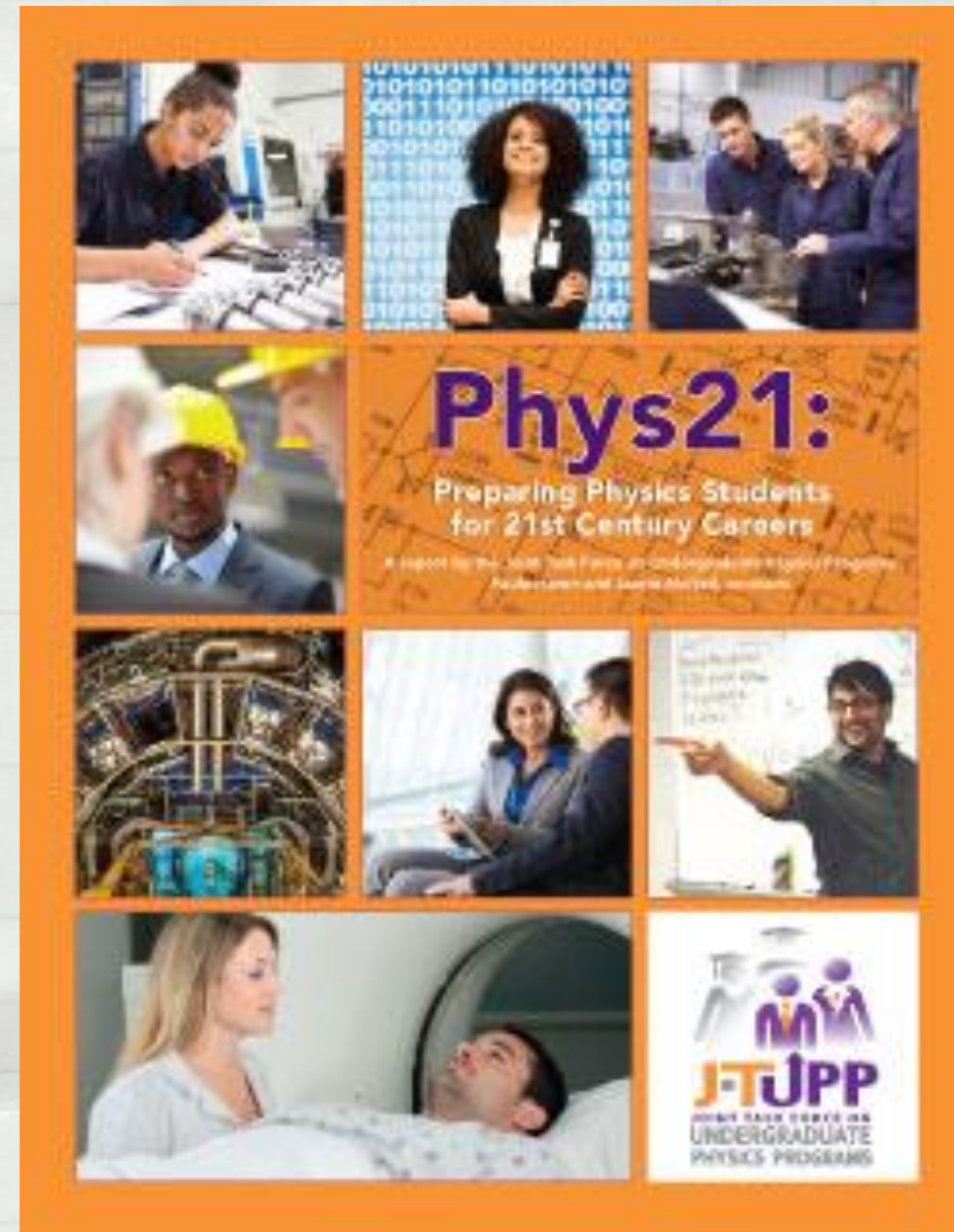
Goals:

- to **deliver tested PIE curriculum** to a wider cohort of practitioners.
- to **assess of effects of PIE implementation** on student and faculty attitudes towards innovation and entrepreneurship, and **examine barriers** to PIE implementation
- to **build a community** of expert practitioners who can mentor other institutions.
- Activities are varied in scope and resources needed; institutions varied in culture and resources available.



Phys21 Report

Preparing Physics Students for 21st Century Careers



Why Now?

Why Shift Physics Culture?

Academia and Physics at a Crossroads

- High demands on degrees to prepare students for multiple future careers
- Rising costs and impact from COVID-19
- Physics needs to justify its existence
- Students need to see that physics is for them and for a wide range of careers



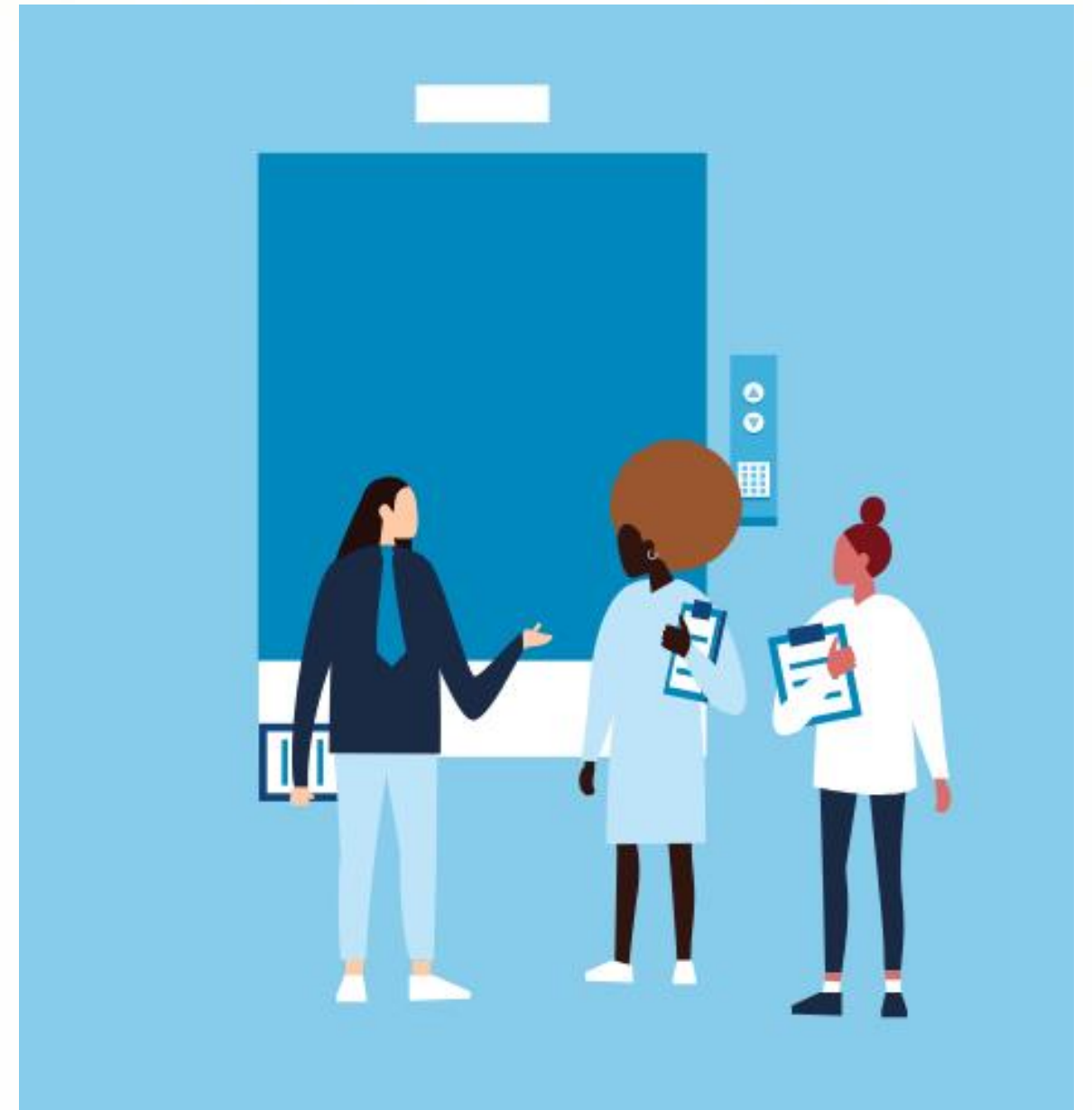
Challenge 1:

www

Curricular Experiences

21st Century Skills are not a Central Part of Physics Curricular Experiences

- Students see 21st century skills related to design, leadership, and business as disconnected from physics
- Employers and faculty see the value in these skills
- 21st century skills are mostly learned through internships, non-physics courses, and labs



Challenge 2:

www

Unequal Opportunities

Not All Physics Majors have the Same Extracurricular Learning Opportunities

- Physics majors are interested in applying their major to a variety of fields, many in industry/private sectors (60%)
- Not everyone has equal access to internships and research experiences, especially for first generation college students (internships) and African American students (research)



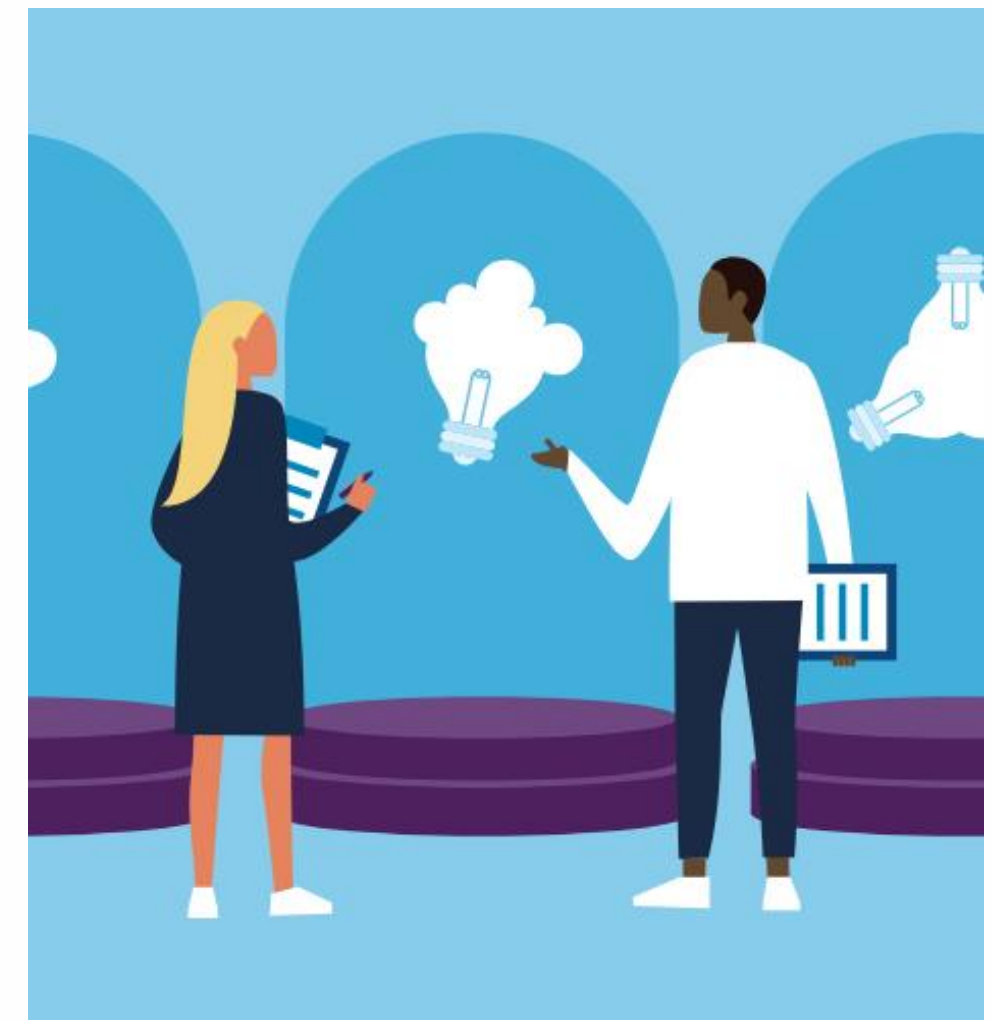
Challenge 3:

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Mismatched Perspectives

Physics Needs a Cultural Shift to Change Mismatched Perspectives

- Students want to learn about positive social impacts of physics
- Curriculum emphasizes negative impacts
- Students value communication and technical skills that they feel are not the central part of physics courses
- Many students lack awareness of their own potential for a range of physics-related careers



PIPELINE First Steps

New Courses and Modules

Social impact-focused curricula like the hyperloop module for intro physics

Technology and Career Focused Pop-Up Courses

Open opportunities for students to learn hands on skills like using arduinos and creating resumes

Communication Activities

Moving beyond communication as an assessment (e.g. lab reports) toward skill-building activities like the CubeSat Scrum

Makerspaces

Makerspaces emphasizing the role of design and business in physics



Physics for Tomorrow (PFT)

Next Steps

Move Beyond Curriculum Changes

Unless faculty and students see the value in the new curriculum for physics, they will not prioritize learning

Connect Across Groups

Conversations between PIPELINE, Alpha, Picup, and other physics education communities will provide better support for making national impact

Shift Department Cultures

Departments can add opportunities for students to explore physics careers, communicate across disciplines, and foster new values (e.g., social impact)