

**Don't Recruit Better Students,
Make Sure Students Know Why
They Should Major in Physics
When You Recruit Them**

- and that will make them better students

**John Rice, Owner of CommonSense
Communications**

**Sacha Kopp, Senior Associate Dean,
University of Texas**

For Sake of Introduction

- Michael Marder says I should tell you I am not a physicist – it's true I don't know physics from phys ed
- After the session with Bob Hilborn last night I went back to the room and tore up my presentation
- I am John Rice from Baton Rouge. Conducted focus groups at six universities in three years for physics. 200 physics majors, 200 non-physics majors. Conducted focus groups at three universities for APS REU project.

How this presentation is organized

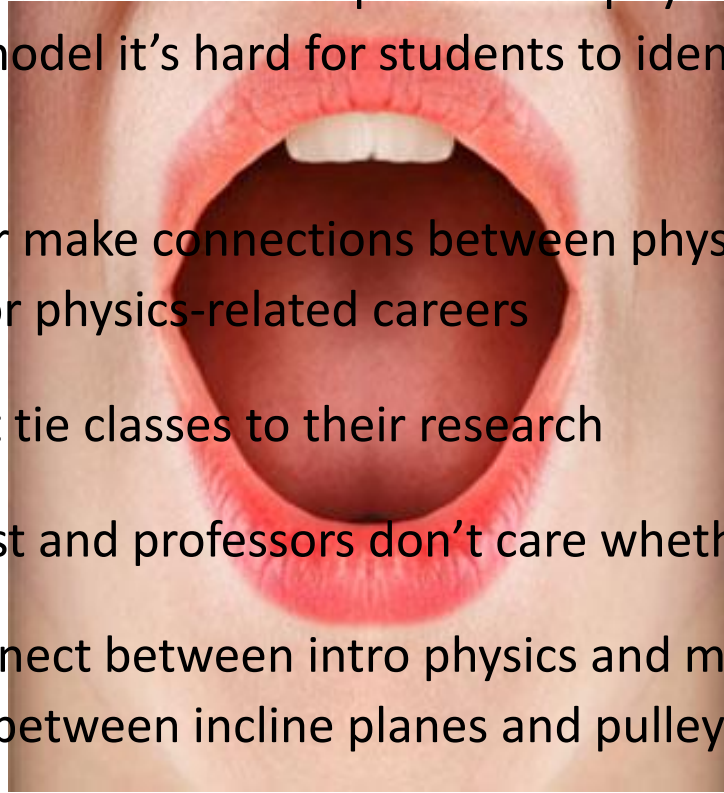
- What you want to know –
 - ✓ How the did University of Texas go from 190 physics majors to 300ish in two years
 - ✓ Let me see all the cool ads, print ads, flyers
- What you need to know –
 - ✓ You have to make sure your current customers are happy before creating new ones
 - ✓ You have to give customers what they want and not what you want
 - ✓ You have to fix the bad rap, bad image, bad brand physics has or you shouldn't recruit or try to increase enrollment at all
 - ✓ You have to ask yourself why you are really wanting to increase enrollment
 - ✓ You have to ask yourself if you have a moral obligation to make physics more accessible to students before they get to your campus.

THE FIRST STEP IN RETENTION IS...

- FIND OUT WHAT YOUR STUDENTS THINK ABOUT THE EDUCATION YOU PROVIDE THEM AND WHETHER IT'S RELEVANT!

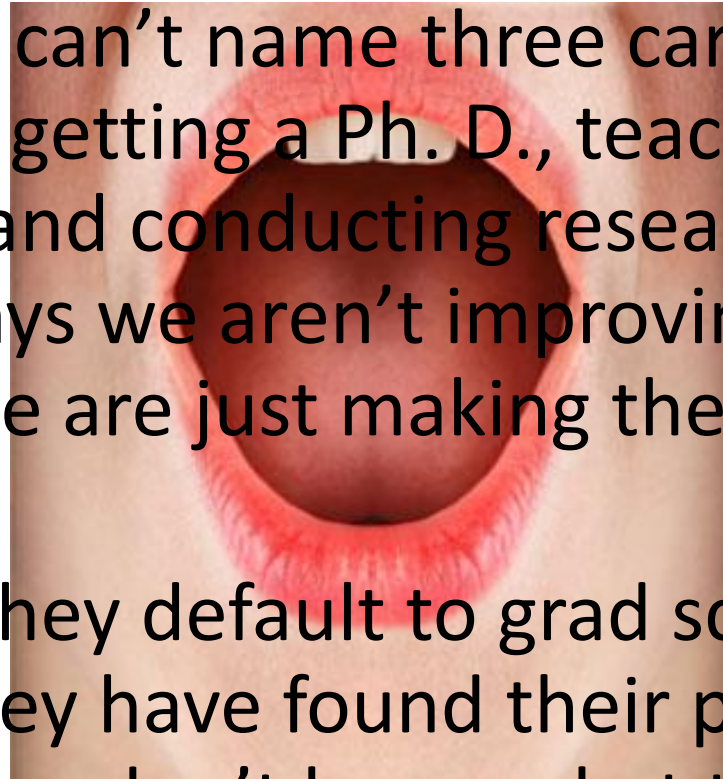
Students Said ...

- Professors don't seem to have a passion for physics and don't discuss it - without a role model it's hard for students to identify their own passions for physics
- Professors never make connections between physics and everyday life, other sciences or physics-related careers
- Professors don't tie classes to their research
- Students feel lost and professors don't care whether they get it or not.
- There's a disconnect between intro physics and modern physics. What's the connection between incline planes and pulleys and black holes.
- Students are majoring physics to pursue the 'why.'



Students said more

- 80 percent can't name three careers in physics other than getting a Ph. D., teaching at a university and conducting research. Carl Wieman says we aren't improving physics students we are just making them like their professors.
- Many say they default to grad school not because they have found their passion but because they don't know what to do.



UT Responded Academically to Marketing and Customer Service Concerns

“I don’t know how physics relates to everyday life and other careers.”

- Freshmen conference course in careers, research
- Held Physics Research Lab Open House
- Put student testimonials and careers testimonials on physics undergraduate website
- Hands-on design course
- Alumni visits to campus – career choices outside physics (LOTS OF THIS)
- Invite high school students on campus for sleepovers

UT Responded Academically to Marketing and Customer Service Concerns -cntd

There's a disconnect between intro physics and modern physics."

- Devoted new 3 credit course to modern physics
- Move modern physics earlier in curriculum
- *Matter & Interactions* modeling class

UT Responded Academically to Marketing and Customer Service Concerns –cntd.

“I feel lost in a sea of complicated physics.”

- Undergraduate Peer Assistants in lower-div courses
- Held Midnight Cram sessions
- Faculty-led recitation sections
- Held a watermelon drop at the conclusion of the Physics Research Lab Open House
- Held science Night at the Movies Lecture
- Assisting with local schools outreach.
- Arcattack singing tesla coil concert

Branding of UT Physics

Told SPS student leaders about focus group findings, plans for the campaign, and asked for their input

Anchored the campaign with real physics student testimonials

Sent emails to all physics and non-physics students taking a physics course telling them changes were being made and what the changes would mean to them

Branding of UT Physics –cntd.

- Used students, esp. those in the testimonials, to make short announcements in physics classes about major events
- Found ways to give out shirts to non-physics majors – there are 250 physics majors. We have given away 2,000 shirts.
- Put a long horizontal banner with pictures of students in the campaign and the tagline. Every student taking a physics class must pass by that banner every time they go to class.
- Found ways to position what we did as news and get ourselves on television and in the student newspaper.

UT Physics

Is the 'why' keeping you up at night? Us, too.

*Leah Hesla and Brian Parks
come up with a bright idea.*



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Why Physics? Exactly!

Why is the sky blue? Why do black holes exist, and what causes them? What's the most likely explanation as to how the Pyramids were built? What math and science explains the underlying reasons about what happens in nature and the world around us? Physics. While other sciences explain how, physics is all about the "why."

Do we promise you'll find answers to all the whys? Nope. We *do* promise that by the time you get your Physics degree, you'll be more intrigued by the whys than ever before. As a result, you'll be the kind of thinker who can take on a wide variety of career challenges, including medicine, fusion, nuclear engineering, teaching, government policy, semiconductor research, science journalism, space and atmospheric research, acoustics, petroleum exploration, business, and—of course—physics.

Don't believe us? Take a look at the [stories](#) of real Physics students and notice the widely varied fields that they are entering. Or learn more about [careers](#) in physics. Or take advantage of the [services and events](#) that we offer, so you can discover your place in physics.

UT Physics

Is the 'why' keeping you up at night? Us, too.

Danny Miller doesn't want to sleep when there are deeper questions to explore.



[Home](#) | [Freshman/Sophomore](#) | [Junior/Senior](#) | [UTeach](#) | [Myths & Facts](#) | [Careers](#) | [Testimonials](#) | [Support](#) | [News & Events](#)

Careers in Physics

Despite what you might have heard, you can do more with a Physics degree than teach at a college and conduct research. Physics teaches you to think. Thinking helps you to solve problems, regardless of the field. Think of Physics less as a career path and more as a skill set or toolkit. That's why the careers below, and pretty much anything else you can think of, are possibilities.

MEDICINE

MRIs, PET scans, and proton beam accelerators are all based on physics. The [proton beam accelerator at M.D. Anderson in Houston](#) is used to treat cancer patients.

FUSION

Do Anything. Do It All. Do Physics.



Dave Maruszewski worked on things that go "boom" for the Naval Surface Warfare Center—a potentially explosive career, but not very exciting.

After spending too much time performing inte

© UT Austin Physics Department

Advertising Physics



*Leah Hesla and
Brian Parks
come up with a
bright idea*

Is the 'Why' keeping you
up at night? Her too.

MEET PHYSICS MAJOR LEAH HESLA

© UT Austin Physics Department



Physics majors Eric Ingang and Andrew Perrone ponder if they got stuck inside of a blackhole, how they might get out.

Is the 'Why' keeping you up at night? Him too.

MEET PHYSICS MAJOR ANDREW PERRONE

Being a well-paid financial analyst didn't add up for Andrew Perrone. Unsatisfied with his job, he took up physics as a hobby after reading some popular books on the subject. "In a nerdy sort of way, it was a fun way to pass the time," Perrone said.

Perrone said he was driven by why the world works the way it does. He was so driven that even though he got his economics degree at Texas A&M, he switched from the Hatfields to the McCoy's and came to U.T. to study physics. While pursuing his physics degree, Perrone found out it wasn't enough to understand why; he wanted to explain it to others. And so Perrone has entered the UTeach program to become certified to teach high school

physics. Perrone says he gets excited about the prospect of explaining things that appear at first blush to be simple. "Most people think they understand a drinking straw," Perrone said. "But if you actually ask them how it works, they probably can't explain why it works. And that's opportunity to talk about pressure and gases."

Perrone says he can already see himself explaining things to students like why the sky is blue through physics. "I'm excited about the thought of explaining to someone something that I find interesting and then seeing the look on their face when it finally all makes sense."

UT Physics

Is the 'Why' keeping you up at night? Us too.

www.ph.utexas.edu/undergrad

512.471.8956 | kopp@hep.utexas.edu

Leah Hesla and
Ethan Parks
come up with a
bright idea.



Is the 'Why' keeping you
up at night? Her too.

MEET PHYSICS MAJOR LEAH HESLA

Leah Hesla had a bad case of physics envy. She was a symphony-caliber violinist with a musicology degree, working for a non-profit. She was unhappy and more so when meeting a physics major. "I would encounter someone in physics and say, 'OHH really? I wish I was doing that,'" Hesla, 33, said. "I was jealous of those who were in physics and doing it."

Hesla thought auditing physics classes would be enough. But for her, physics was the potato chips of science. She couldn't stop at one or two. At age 29, she was back in school but for a specific reason. "Other disciplines don't explain why things happen," Hesla said. "Physics does explain why."

Hesla said it even explains the 'why' of things we think we understand. "There's a YouTube video of a stream of shampoo pouring into a pool of shampoo," Hesla said. "It goes in and bounces way up and then goes in again and bounces some more. And you wouldn't expect a bouncing behavior from shampoo. But it does and physics can explain that."

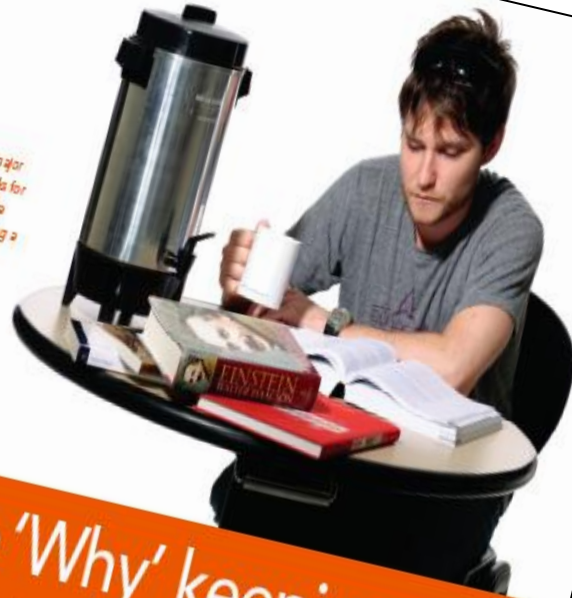
Now Hesla's off to John Hopkins to get a masters degree in science journalism. Why? Yes, it's still about the why. "I think I will find a lot of joy in giving the explanation about something in science to everyone else, so they can understand why," Hesla said. "I might help discover something that influences government policy."

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Senior physics major
Danny Miller looks for
the 'why' in class
strong coffee during a
physics all nighter.



Is the 'Why' keeping you up at night? Him too.

MEET PHYSICS MAJOR DANNY MILLER

In seventh grade, Danny Miller was introduced to the idea of black holes. That led to a list of questions fueled by physics that grows longer for Miller even at age 26.

"I remember black holes really rocking my world," Miller said. "I absolutely wanted to know the why behind it. The strangeness of it, the peculiarity of it, was captivating. It was so foreign to me that things like this can and do exist in our universe."

Now, Miller enjoys the adventure of exploring the big questions. "The big questions are ultimately what you are trying to figure out," Miller said. "You are attempting to get into the mind of God."

You are trying to determine the rules of the universe that we all play in. I have considered these things a lot in my life and it is very important to me, not in terms of anything I hold sacred, but rather because it's just so important."

The irony is that when he had the chance to study black holes in graduate school, he opted to work on fusion at MIT. "If we don't come up with a unified theory of things, the public won't mind," Miller said. "If we don't come up with a sustainable energy source, we're screwed."

UT Physics

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Physics is like sex.

[Sure, it may give some practical results,
BUT THAT'S NOT WHY WE DO IT.]

RICHARD P. FEYNMAN—PHYSICIST

MYTHS AND FACTS ABOUT UT PHYSICS

MYTH: *I'm planning for medical school and physics is not the right option for me.*

✓FACT: Students going to medical school can major in physics, be pre-med and do a good job at both. In fact., a physics major augments a medical education. Physics offers a solid foundation for some of the most important advances in medicine, such as diagnostic imaging, nuclear medicine, and proton beam therapy such as offered at MD Anderson's new proton linear accelerator.

MYTH: *Getting a degree in physics will take too long.*

✓FACT: A BA in physics requires only 22 credit hours in physics beyond the introductory course and 6 hours math beyond calculus. A BS requires 31 credit hours in physics beyond the intro sequence and 15 in math beyond calculus. Compare that to 48 hrs for a BS in Chemistry or a 60 hrs for a BS in Biochemistry.

MYTH: *Physics is just too hard.*

✓FACT: Every major is hard. Some majors require you to memorize a lot of material. Our major teaches you to think. It's that skill of problem solving that's more useful than anything else physics has to offer, and we're here to help you develop that skill.

MYTH: *I would be reluctant to consider a degree in physics, since an engineering degree is more practical.*

✓FACT: With a degree in physics, you can go into medicine, nuclear engineering, teaching, government policy, semiconductor research, space and atmospheric research, acoustics and petroleum exploration, and of course physics. It is easier for a physicist to be hired as an engineer than it is for an engineer to be hired as a physicist.

MYTH: *I'm just not ready to commit to the program because I'm not sure I would like it.*

✓FACT: That's why up to \$500 in scholarships are available to students who register as a physics major and take the introductory PHY301/316 sequence as well as PHY110C "Science of the Times" and make at least a "B". This allows students to test-drive the program and see if they like it.

MYTH: *There's a catch. I have to commit for a longer time, right?*

✓FACT: No catch. No commitment. No kidding. After this point, if you are registered as a physics major you are further eligible for scholarships for continued progress toward your physics degree. Nearly 25% of upper-division physics majors receive financial aid from the department.

I've Told You What You Wanted to Know....

- And you're thinking the problems to getting more students happens on your campus and in your department They can be impediments but that's not where they happen.
- It happens in high school classrooms – or doesn't happen First.

What High School Science Students Say

- 70 percent say physics they like physics – it's their favorite class, favorite science class or second favorite science class
- Most say they will be engineering majors or pre-med majors
- Why not physics?
- There's nothing you can do with a physics degree

Why Do They Say Those Things?

- No One Makes The Case for Physics in the High Schools..... And...
- What is the Case for Physics?

No One Wants to Do High School Outreach

- It's too hard, too time consuming
- I have done demos before and it got me nothing
- It interferes with my research

You Should Do High School Outreach Because

- Physics claims to explain everything
- It doesn't make sense there is nothing that you can do with it
- When you tell high school students careers they can do with careers, 40 to 60 percent more students say they would consider it
- When you tell high school and community college students there is hands on experience they can get through undergraduate research 44 percent of community college students say they would consider it.

You Should Do High School Outreach Because ...

- It's your moral duty to tell students what they can do in physics
- If you don't tell them who will?
- If you don't tell them who should?
- If you got just a half of the kids who say they love physics you could save your programs.

The Basics of Outreach

- Have undergrads do it
- Do demos that you can tie to everyday life or careers – i.e. Rubin's Tube, Ringing phone in a Bell jar you can't hear
- Have real life stories about students who are doing things they can relate to
- When you do demos hand them the testimonial or something that will drive them to the website

The Basics of Outreach

- Leverage PER contacts with teachers to get into the classrooms
- Leverage PER or any best teaching practices as a way to show students physics can be fun - FIU
- Use your graduate and undergraduate research labs as recruiting tools
- The point of outreach is to get them on your campus to your department to see research and talk to kids

John's List of Traits of Thriving Departments

- Provide students their own space to work
- Make sure professors are available, approachable
- Emphasize !!!!! And provide undergraduate research
- Make sure students know what an REU is
- Have faculty who are close to 50 than 60

John's List of Traits of Thriving Departments

- Have PER groups
- Leverage those PER groups and best practices
- Use their labs as recruiting tools
- Constantly ask their students what they think they are going to do after graduation and when they say 'I don't know' they give them a list of twenty things they could do
- Don't only push grad school – actively or passive aggressively