

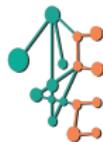
# Introduction

Clubes de Ciencia - Ensenada 2017

Frank Wilzcek Course

Cody Petrie & David Rojas

Universidad Autónoma de Baja California



Clubes de Ciencia  
México



- In this class we're going to learn how to use technology to augment our understanding of the world around us.
- We are going to learn about ...
  - Computer programming with Python
  - Circuit building and Arduino
  - Methods for learning about the world around us
- We want to make sure that you get what you want out of this class . . . what do you guys want out of this course?

- To get your Diploma you need to . . .
  - “Full attendance” which means you participate everyday (if you have to miss a day that’s okay, just let us know).
  - Complete intro survey on your CdeC profile (We’ll do this in a minute)
  - Complete exit survey on your CdeC profile which becomes available on Saturday.

# Complete Survey

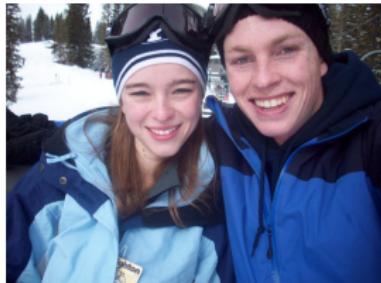
# Introducing Cody

# Cody - Family

- Undergraduate degree from BYU in Physics with a minor in Astronomy. Now I'm in physics PhD program at ASU.
- There I met my beautiful wife and we got married. I got her to fall in love with my by putting spanish love notes on her car while she was working or at school :)
- We have three kids, Ammon (4.9), Cooper (3) and Olivia (0.5)



# Cody - Hobbies



- Computational Nuclear Physics.
  - Quantum Monte Carlo methods to solve for energies of nuclear systems like  ${}^4\text{He}$ ,  ${}^{16}\text{O}$ ,  ${}^{40}\text{Ca}$  and symmetric nuclear matter.

$$E = \int dx_1 \int dy_1 \dots \int dz_N \Psi^*(R, t) H \Psi(R, t) \quad (1)$$

- This is a lot of integrals over complicated things...  $\Psi$  is complicated and  $H$  is complicated.
- So we “cheat” and use Monte Carlo methods!



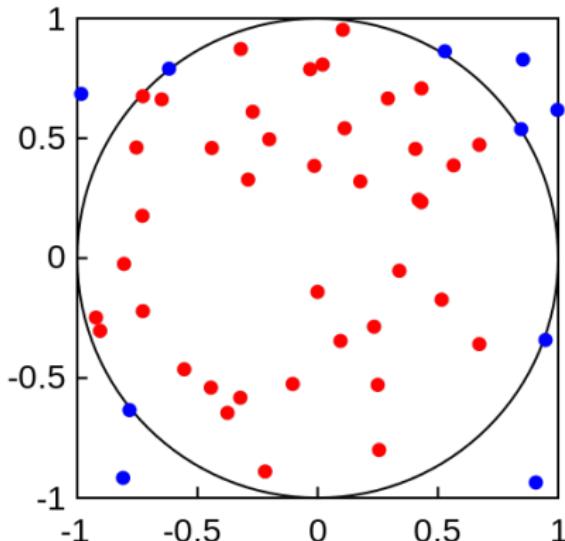
# Cody - Monte Carlo Integration

- If you wanted to know the area of a circle you would integrate

$$A = \int \int_{x^2+y^2 \leq r} dx dy = \int_0^{2\pi} \int_0^r r' dr' d\theta \quad (2)$$

- Or you could use Monte Carlo integration where

$$A = \frac{N_{circle}}{N_{total}} A_{square}.$$



David

# Introducing David

# David

- Ingeniero en Nanotecnología, por parte de la Universidad Autónoma de Baja California. Este Septiembre ingresaré a la Maestría en Óptica del CICESE.
- Soy originario de Durango, México.
- En la Preparatoria la escuela me parecía aburrida y al salir de ésta ingresé al Ejército Mexicano por un año.

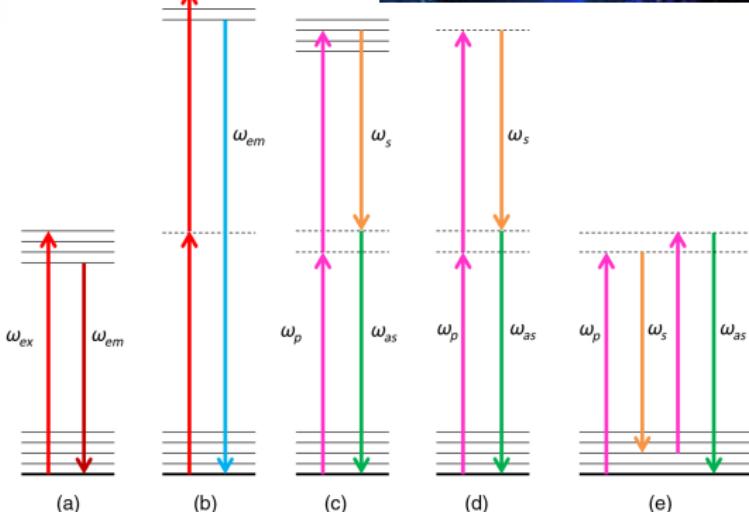
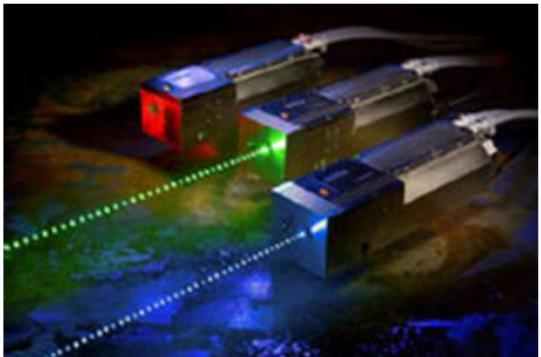
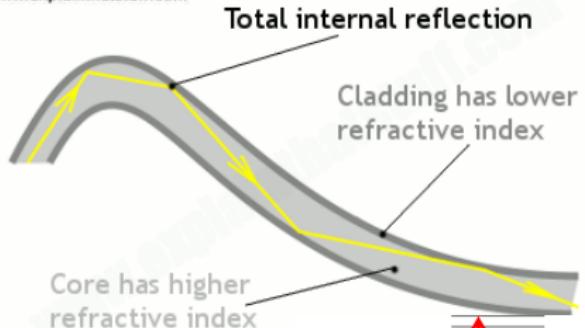


# David - Hobbies



# David - Research

[www.explainthatstuff.com](http://www.explainthatstuff.com)



## What Can A Quantum Computer Do Better?

Quantum computing will solve a class of problems that are unsolvable today, opening up a new realm of applications.

03

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SEARCHING BIG DATA



DESIGNING BETTER DRUGS & NEW MATERIALS



MACHINE LEARNING



CRYPTOGRAPHY

- Two-truths and one lie?

# Picture Citations

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Dice (accessed 24 July 2017): [http://www.thelegalintelligencer.com/image/EM/PA/rolling\\_dice-Article-201504021454.jpg](http://www.thelegalintelligencer.com/image/EM/PA/rolling_dice-Article-201504021454.jpg)  
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[http://biomedicaloptics.spiedigitallibrary.org/data/journals/biomedo/934300/jbo\\_20.8.086006\\_f001.png](http://biomedicaloptics.spiedigitallibrary.org/data/journals/biomedo/934300/jbo_20.8.086006_f001.png)  
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