undergraduate physics newsletter

Volume V, Issue #5, February 2008
UP News Online: ***http://www.phys.ufl.edu/~upnews***

SPOTLIGHT ON Dr. John Yelton

by Alicia Swift & Steven Hochman

UPNews: Let's start from the beginning. Where are you from / where were you born?
John Yelton: I was born in Birkenhead, England. It's right across the river Mersey from Liverpool which is on the west coast. I grew up, however, in Southern England.

UP: Where did you go to school?
JY: I went to the University of Nottingham for my undergraduate studies. I then went to the University of Oxford to get my PhD which they call at Oxford a "D.Phil". I spent three years at each school and defended my thesis "High Transverse Phenomena at the CERN ISR" (proton- proton) in 1981 at age 24. In England, we specialize early, so graduate young.

UP: So you were a good student?
JY: I was good at finding out what I needed to know for tests.

UP: What led you to major in physics?
JY: In the first year at Nottingham, I was studying both Physics and Chemistry. I found the Organic Chemistry labs to be quite troublesome though, and moved completely to Physics. Mathematics was my favourite in grammar school. I went to Colchester Royal Grammar School.

UP: What did you do after you got your PhD?
JY: I worked for four years at Stanford working as a post doc at SLAC (e+ e- annihilation). After that, I worked for two years at Oxford as a temporary faculty member. In 1987, I came to UF.

UP: What kind of physicist would you consider your self?
JY: High Energy Experimentalist.

UP: And what research do you do?
JY: I have belonged to the CLEO collaboration since 1988, looking at e+ e- annihilation in an energy regime which we no longer consider to be High Energy. I'm also a member of the Compact Muon Solenoid (CMS) collaboration, which will be taking data from the Large Hadron Collider (LHC) starting later this year. Much of my work over the last twenty years has been on the topic of charmed baryons.

UP: Charmed Baryons?
JY: A charmed baryon has a charmed quark as one of its 3 constituent parts. Recently, however, CLEO has gone down in energy below the charmed baryon threshold. I've been studying decays of various cc-bar mesons. I'm particularly excited about recently discovering the 1st Baryon decay mode of a D_s.

UP: What part of the research is this?
JY: I've concentrated on data analysis rather than building the detectors.

UP: What is involved in this work?
JY: Well there's a software infrastructure in place. It's all in C++ now. It used to be in Fortran. So there's a decent amount of coding to be done.

UP: You have discovered new particles?
JY: Yes, I discovered the Xi C 0, which is a charmed Xi with no charge. It is made of d, s, and c quarks. I've also found several excited states of that and other charmed baryons.

who we are

UP is a monthly undergraduate physics newsletter sponsored by the University of Florida's chapter of the Society of Physics Students, for students, by students. We seek to strengthen the undergraduate physics community at the University of Florida by providing a forum for undergraduates to share their views and experiences with each other and to act as a source of information for opportunities and events in physics.

Visit Department
Coffee Time
Mondays & Tuesdays
3-3:45pm in NPB 2205
Professors, staff, and students are all invited!
Coffee, tea, hot cocoa, and cookies only 50 cents

what's UP
in this issue

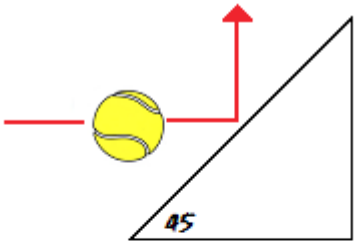
PHYSICS of PHLIPS

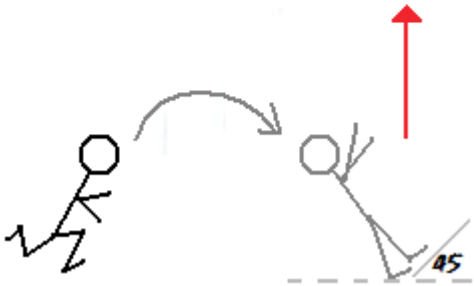
by Harold Rodriguez

In order to fulfill the UPNews requirement of at least one comically misspelled word, we analyze the physics behind flips. If you want to flip a ruler, you apply a torque away from the spin axis (like its geometric center). However, this strategy doesn't work well when flipping yourself. How can you apply a torque to your feet, and/or head (in the opposite direction) strong enough to cause you to rotate? No, flips usually work by effectively changing your angular momentum via mass redistribution, not by applying big torques.

For a backflip, instead of kicking forward with your legs and pushing your head back, you must start by jumping *straight up* first. Counter-intuitive, yes, but here is where physics saves your neck. Before the push-off, throw your arms backward as you contract your legs. You're building all this potential energy in your legs to release in one large impulse. Now jump! As you gain height, swing your arms forward and upward, giving you even more lift. Since your arms have inertia, and since they extend radially from your body, they will also have a small backward component after they reach the vertical. As your body begins to slowly rotate backward, contrary to common sense, don't push your head backward! Tuck your legs inward towards your chest. This rearrangement of mass causes your body to spin since you're bringing mass closer to the spin axis. Of course, it takes some work to do so, which is why your abs will hurt from excessive backflipping!

Frontflips are based on inertia and manipulation of velocity components. Take a few bounds forward, gaining a considerable amount of horizontal momentum. Then, jump forward, trying to land at a 45 degree angle to the floor. The reason for this is illustrated in the diagram. If you wanted to change the direction of a tennis ball from horizontal to vertical by hitting it against a wall, how would you want the wall oriented? Forty-five degrees! So, after pounding the ground hard, a lot of your horizontal momentum should be converted into vertical momentum. Then, the inertia of your body's upper-half should be "continuing" it forward, despite your stationary lower-half, at which point a tuck will complete the frontflip. Hence, the move is almost self-performing (if you know and trust the physics behind it). With that said, I hold no accountability for any ways you may find to break your neck. Good luck!





RANDOM FACTS

compiled by Harold

It's amazing how much information google can bring to your fingertips. Here are just a few interesting things I found with little to no effort!

The maximum speed that raindrops can fall at is around 18mph, depending on their size.

Every rainbow is unique - each rainbow is formed from light hitting your eye at a very precise angle. Someone standing next to you will see light coming from a slightly different angle than you, and will therefore see a different rainbow.

A TV screen shows 24 pictures a second. Because a fly sees 200 images a second, it would see TV as still pictures with darkness in between.

Think about astronauts in space, and how they burp. Because you are weightless in space, the contents of your stomach float and tend to stay at the top of your stomach, under the rib cage and close to the valve at the top of your stomach. Because this valve isn't a complete closure (just a muscle that works with gravity), if you burp, it becomes a wet burp from the contents in your stomach. Gross!

When a flea jumps, the rate of acceleration is 20 times that of the space shuttle during launch.

The planet Venus's day is longer than its year. It takes 225 'Earth' days to rotate around the Sun (a Venusian year) and 243 'Earth' days to rotate on its axis (a Venusian day).

SPS: PAST, PRESENT, AND FUTURE

by James Stankowicz

SPS has not been hiding this semester, although it may seem that way! Because the physics building is such an exciting hub of activity, the last few SPS meetings have been displaced from the normal, beloved NPB 2205, but expect meetings to be returning there in the future. Despite the wacky relocations, SPS has managed to get a few things done:

Meeting Wednesday January 23:
The normal SPS room (NPB 2205) was booked. Who knew there'd be other people in the physics building so late at night?!?! So, this first meeting of the new semester took place in the smaller of the two lecture halls. This was perhaps somewhat more convenient because the normally free and therefore delicious pizza could be enjoyed while sitting down at a desk, instead of precariously balancing it in your lap. This increased the order of magnitude of the deliciousness by one. The main topic of the night was REUs. Professor Ingerset, who heads the UF Research Experience for Undergraduates program gave general advice for applying to REUs. SPS also has a new listserv that will be replacing its old one. To join, simply send an e-mail with a blank subject line to listserv@lists.ufl.edu. In the body type "Subscribe spsmembers-L" (not including the quotes). This is the only way to ensure that you receive e-mails from SPS, as the old list will no longer be used.

Research Opportunity For Undergraduates
Monday February 4:
Again, NPB 2205 was booked, so (with at least some advance notice this time) this meeting took place in another meeting room upstairs in NPB. There was of course, free, delicious pizza, again made much better by the available table space. Professors Lee and Hebard are both looking for undergraduates to work in their laboratories, and spoke to that effect. Dr. Lee works in low temperature physics, and Dr. Hebard works in condensed matter.

Feynman Lecture
February 19:
Barring any surprises, the SPS is returning home to NPB 2205 to show another of the Richard Feynman Messenger Lectures at 6:30 PM on Tuesday, February 19. The last few years, Dr. Hirschfeld has been showing these lectures to his Theoretical Physics students in the fall, but there has been enough interest that he's decided to show them in the spring, too. And who's going to say no to a night of free pizza and a free physics lecture on old, reely, film? These lectures aren't very mathematical in nature, and tend to give insight into physics in terms that are fairly easy to understand and very thought provoking.

PHYSICS BOOK CLUB

The God Particle: If the Universe Is the Answer, What Is the Question?, written by Dick Teresi and Nobel-prize winner Leon Lederman (who helped develop the technique to find the pion), is a great read that requires a little patience due to its length. Even though written for the layman, it is nonetheless a very interesting book. It begins with the history of science, from Democritus to Galileo to Newton to Maxwell to Rutherford, and eventually sets the stage for the introduction of quantum mechanics in the 20th century. The last quarter of the book is dedicated to the search for the Higgs Boson, termed the "God Particle", as both are terribly elusive and unproven. I found this book fascinating; to see the progression of science from the Greeks to modern day was fabulous because we often hear of scientists, but are never told much about them. If you are interested in a book with quite a few physics stories, and which is informative but not too much of a mental strain, you will enjoy reading *The God Particle*.

CONTINUED FROM
FRONT

UP: I notice they didn't name it after you?
JY: No, unfortunately a naming system is in place for most particles.

UP: You also teach. Do you enjoy it?
JY: Yes. I've tended to teach the lower level courses. I prefer knowing more than my students! I find some of my colleagues prefer the higher level classes to the lower levels ones. Right now I'm teaching a 3000-level Mechanics class, though, and I have taught graduate levels classes in the distant past.

UP: How many classes do you teach in a semester?
JY: I always teach one every semester.

UP: You don't teach in the summers though?
JY: In the summers I have gone to Cornell where the CLEO experiments are. There are many advantages to being onsite. You get to know the people after a while. I did spend several weeks at CERN as well last year. Now CLEO is coming to an end, I am spending more time at CERN.

UP: What are your favourite colours?
JY: Purple and Orange.

UP: What is your favourite movie?
JY: Monty Python's Life of Brian.

UP: What is your favourite kind of music?
JY: I listen to British folk music of the 1970's and some classical music.

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UPNews is always looking for undergraduates who want to contribute. If you'd like to get involved, e-mail us at upnews@phys.ufl.edu

HAPPY BIRTHDAY ***Boltzmann***

by Larry Camarota

So, what did you do on February 20? Perhaps you just went to school. Maybe you stayed up to see the eclipse. You should have considered celebrating Ludwig Boltzmann's 164th birthday.

I'm sure that name rings a bell, if for no other reason than Boltzmann's constant ($k=1.38\times10^{23}$ J/K). This constant is instrumental in his most famous equation, $S = k \times \log(W)$. With this formula, Boltzmann was able to completely mathematically define entropy as a measure of disorder. This equation was of such monumental import that it was carved on his tomb.

Ludwig Boltzmann was born on February 20, 1844, in Vienna, Austria. He studied physics at the University of Austria. When he was 25 he was appointed to a chair of theoretical physics at Gratz. Over the next few years, Boltzmann would move from University to University accepting new positions. Boltzmann liked to say that the reason for his constant dislocation was that he was born at a Mardi Gras Ball. In his later years, Boltzmann would also lecture on natural philosophy. These lectures were very popular, and would often overfill the largest room at the University of Vienna.

Boltzmann did have a number of scientific opponents. Principally, the opposition came from physicists who did not like the irreversibility implicit in the Boltzman equation. He also gained animosity for his support of the atomic theory, which was not widely recognized at the time.