

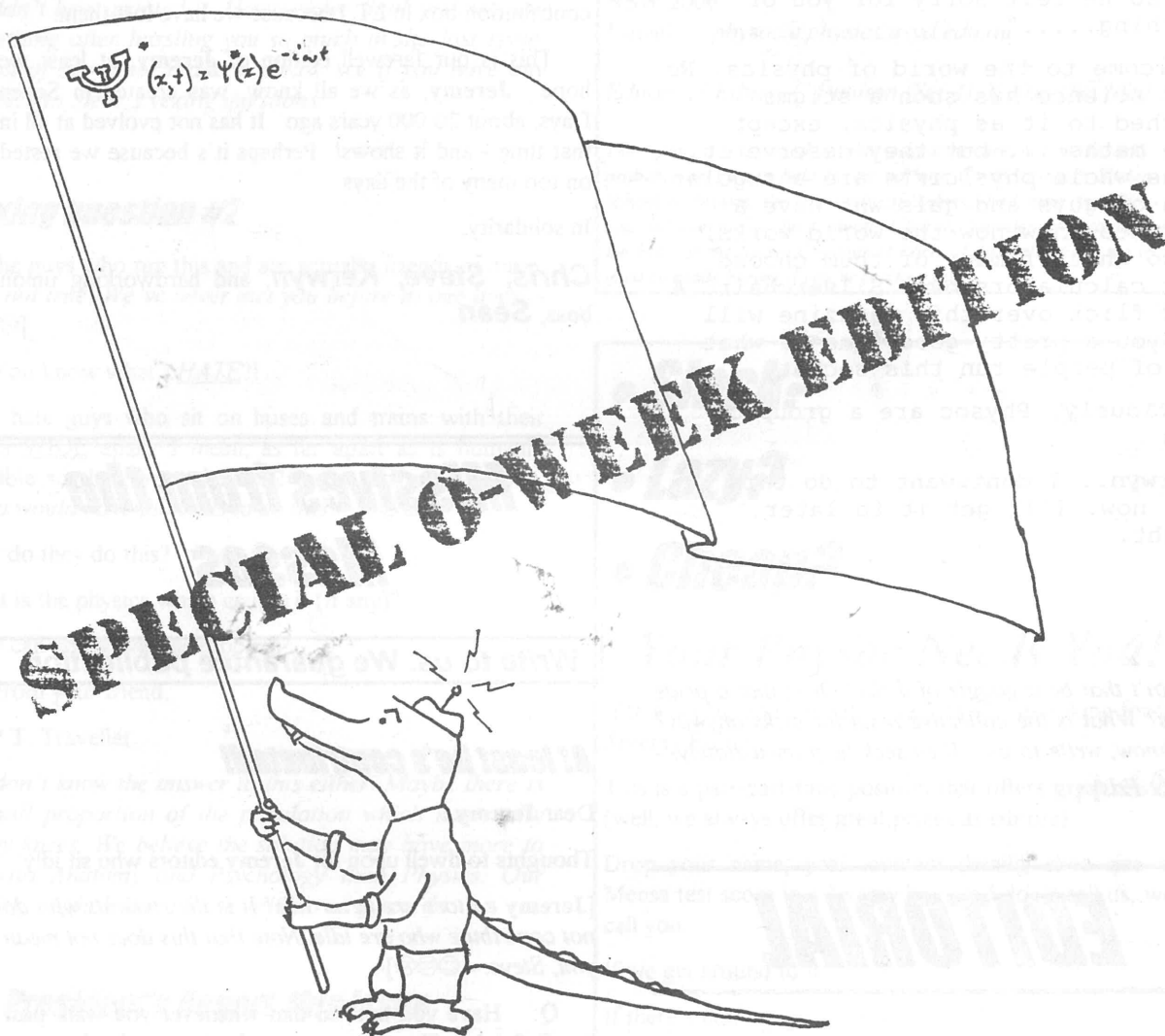
Supported in Solidarity by the University of Sydney Union, Physoc, and the SRC

The Jeremy

INTERNATIONAL WORKER

Volume 11, No.1

February 1995



In this People's Democratic Publication:

- ★ More opiates for the masses in *The Young and the Rest-mass*
- ★ Reviews of capitalist indoctrinatory propaganda
- ★ A new Dead Physicist Crossword
- ★ Red Is Faster
- ★ Workers in Physics? How to try to be one.
- ★ The People's Physics 4-um

Physicists of the world unite! You have nothing to lose but your brains!

Reporto El Presidente

From matt@physics.su.OZ.AU
Date: Fri, 10 Feb 1995 17:00:03 +1100
From: The Alchemist
<matt@physics.su.OZ.AU>
To: kerwyn@physics.su.OZ.AU

"You study what?"

"Physics."

"Oh.... err.. So what are you doing here?"

"I know the guy who's hosting the party."

"Oh. So he felt sorry for you or something....."

Welcome to the world of physics. No other science has such a stigma attached to it as physics, except maybe maths ... but they deserve it. On the whole physicists are a regular bunch of guys and gals who have a desire to know how the world works, and so what if many of them choose solar calculators over Silverchair. A quick flick over this magazine will give you a pretty good idea of what sort of people run this society....

Seriously, Physoc are a group of dicks

Kerwyn.. I dont want to do this right now. I'll get it to later tonight.

Matt.

[Shouldn't that be a gaggle of dicks? Or is that a pride of dicks? What is the collective noun for dicks anyway? If you know, write to us. Then seek help immediately. - ☺☺☺ Eds]

EDITORIAL

Well after such an inspiring introduction from our (ex) President we expect that popular revolution will overthrow the cruel despotic regime of the bourgeois elitist President. It is just like Matt to wash his dirty lenin in public, and shame on him for mao-thing off like that. Full marx for effort though.

Power shall be transferred into the hands of Proletariat, that is to say, we three humble editors would be glad at the opportunity for employing our natural talent for leadership. From each according to his abilities, to each according to his needs. We will build a new president... bigger... stronger... taller than before.

As usual, contributions from our rank(!) and file members have been pitiful. Except, of course, for our loyal fan and hero of the people Steve Budak. He is truly a visionary and will lead the pages of this journal into a bright new future, free from the oppressive rigours of pure mathematics.

For those of you who are new to this publication, and physoc, Welcome! Matt has missed his deadline, so we have to do his work for him, as usual. As you may have guessed, **Jeremy** is the official publication (and mouthpiece of the people) of the (glorious) *Physics Society* of Sydney University. Throughout these pages, you might find the answers to life, the universe etc etc and if you do could you please drop these into the contribution box in LT 1 because we have lost them.

This is our farewell edition of **Jeremy**, at least we hope. **Jeremy**, as we all know, was created in Seven Days, about 20 000 years ago. It has not evolved at all in that time - and it shows! Perhaps it's because we rested on too many of the days.

In solidarity,

Chris, Steve, Kerwyn, and hardworking union boss, **Sean**.

Missives from the Masses

Write to us. We guarantee publication.

At least he's contributed!

Dear **Jeremy**,

Thoughts to dwell upon for **Jeremy** editors who sit idly:

[**Jeremy** editors are never idle! It is the students who do not contribute who are idle. Note that this does not mean you, Steve. - ☺☺☺]

Q: Have you noticed that whenever you walk past Ian Sefton's office, he seems to be in exactly the same position as the last time you walked past his office? I mean, *exactly* the same position; about a foot from the desk, staring at his computer (with the head tilted back at about 30 degrees from the vertical), hands laying idle, sitting in the same chair. If you took a photo of it all on one day and then took a photo on another day, I bet you couldn't pick which one was which!

Perhaps we could conduct tours of the physics building, and call it **Jeremy Wax Works**, all of Sydney University's greatest physicists in their natural environments.

[What? We have no idea what you're talking about! We just don't understand! - ☹☹☹]

Another thought, perhaps he worked out the Grand Unified Theory and was so shocked by it, that he simultaneously exited this dimension to go to one higher (or lower (or lefter [or one with more nested parentheses - ☹☹☹])) but left behind his two and a bit dimensional body!

Well, I'll leave you to it.

Steve Budak (Science I, 1994).

Well, Steve, if anyone else but you had sent this, we wouldn't have printed it. However we think we owe you something after hassling you so much in the last issue. To all of our other readers, please see if you have any answers to Steve's vexing questions.

Vexing question #2

To the guys who run this and are actually friends of mine: [It's not true! We've never met you before in our lives! - ☹☹☹]

You know what I HATE?

I hate guys who sit on buses and trains with their knees WIDE apart. I mean, as far apart as is humanly possible so that they take up 2 seats and not just one. [Who would have the balls to do this? - ☹☹☹]

Why do they do this?

What is the physics which causes it (if any)?

How can you solve this problem?

From your friend,

P.T. Traveller.

We don't know the answer to this either. Maybe there is a small proportion of the population which has really heavy knees. We believe the solution may have more to do with Anatomy and Psychology than Physics. Our readers might know. Please write to us if you do.

RE: President's Report, this issue

Dear Jeremy,

As a **Jeremy** subscriber and a card-carrying member of Physoc, I am shocked and affronted by the abuse levelled at me and my comrades by our so-called Leader.

If our President believes we are a herd of dicks (I think that's the one), does that make him the Head Dick? Or should that be the other way around?

When the revolution comes, he will be the first against the Physics Building wall. The Great Purge will rectify his ideology to the pureness required in a Supreme Leader.

Naes Sirhc Nywrek Evets.

Engineering III, Science IV, Med III, and Science IV.

Letters should be brief (or we will edit them). They can be left in the

Jeremy

contribution boxes, or sent to us care of Physoc. Please say it is for Jeremy, and put your name and faculty/year on the letter.

Jeremy

Sydney University Physics Society

School of Physics A28

University of Sydney

NSW 2006

E-mail: physoc@physics.usyd.edu.au

Editors: S Edney, C Poulton (Sci 4), K Foo (Sci/Med 3)

The opinions expressed in this magazine are not necessarily (but probably are) those held by the editors, the SU Physics Society, the School of Physics, the University of Sydney, the Union, the SRC, - are you still with me? - the Catholic Church, Non-denominational faiths, the PLO, or the Nudist Communist Party of Australia. Gee, the lecture must be really boring if you're reading this!

• **Slack?**

• **Lazy?**

• **Cheap?**

Your Physoc Needs You!

If this is you, you have the qualities we're looking for in a **Jeremy** Editor.

This is a part-part-time position that offers great rewards (well, we always offer great prizes as editors).

Drop your name, year, contact details, shoe size and Mensa test score in a Jeremy box, and don't call us, we'll call you.

If we get around to it.

If there's nothing good on TV.

If the weather's bad enough to stay inside.

FOR SALE

3 editors.

Good condition.

Low mileage.

Make an offer.

LOYAL WORKER ACHIEVES OUTSTANDING BREAKTHROUGH:

Measuring the Speed of Light in the Second Year Physics Lab

David Mar

Many people (mostly second year students) think that the second year lab is a waste of time. Well, to quash these ugly rumours once and for all, we present an ingenious new method for measuring the speed of light with high accuracy, using no more equipment than that easily found lying around the lab.

Have you ever noticed that when you switch off a laser, there is a noticeable time delay before the spot of light actually disappears? Utilising this important observation, a laser was set up to project a beam of light down the length of the lab, and the time delay between switching the laser off and the disappearance of the red spot on the front wall was measured with a stopwatch.

Ten observations of this time were made, shown below:

0.38 s	0.53 s	0.44 s	0.34 s	0.37 s
0.38 s	0.37 s	0.37 s	0.47 s	0.41 s

The mean time and standard error of the mean from these readings was 0.41 ± 0.01 s, but since the readings of 0.53 s, 0.44 s, and 0.47 s are clearly anomalous¹, they were discarded. The mean of the remaining seven readings was 0.374 ± 0.001 s, which is clearly a better result since the uncertainty is so much lower².

The distance from the exit aperture of the laser to the diffuse reflecting planar surface upon which the coherent light beam was observed³ was carefully measured⁴ and found to be 18.49 ± 0.01 m.

Applying careful thought to the peculiarities of the chosen geometry, it was realised that the photons of the light beam were actually travelling twice this distance — to the front wall and then back again to the eye after reflection. The total distance travelled by the light is therefore 36.98 ± 0.02 m.

Dividing the distance travelled by the observed time lag, the deduced speed is 98.9 ± 0.3 ms⁻¹. Thoughtful readers will have realised already that this is not actually the speed of light, *per se*, but the speed of *dark*, as the observations were made of the time lag between turning the laser *off* and observing the arrival of the *dark* at the front wall.

However, it can easily be shown by symmetry arguments that the speed of dark is related to the speed of light by

$$c = \frac{3\pi c_{\text{dark}}}{8\alpha^3},$$

where

$$\alpha = \frac{e^2}{4\pi\epsilon_0\hbar c} \sqrt{\frac{\epsilon_0}{\mu_0}} = 7.29735 \times 10^{-3}$$

is the dimensionless atomic fine structure constant.

Performing the calculation, the resultant speed of light from this experiment is $(2.998 \pm 0.009) \times 10^8$ ms⁻¹, which is consistent with the accepted value of 2.99792×10^8 ms⁻¹. In fact, the agreement is good to the fifth significant figure, indicating that the uncertainty estimates used throughout the experiment were somewhat conservative.

- *Red is faster!*
- *Cosmic background radiation as a measure of alien civilisations*
- *Jelly snake dynamics*

Jeremy will publish all your inspired thoughts without regard of accuracy, reproducibility, or correctness. Yes, I know, this ad is just a space filler and another blatant self promotion device, but we really do want your contributions of

DUD THEORIES

¹This is a great word to use when describing data you don't like.

²Always a good justification for throwing away dodgy data.

³The front wall of the lab.

⁴With z "end to end" technique using two wooden metre rules.

Red Is Faster¹

Stephen Q. Edney², Darren X. Gardner³, Kerwyn Z. Foo, and various others.

ABSTRACT: A hypothesis was made that Red is Faster than other Colours. It was tested many times in many different and complex ways. We were found to be correct. The conclusion was drawn that Red is Faster.

Introduction

It is known that there are many colours. Some of these are Green, Blue, Yellow, Purple, Mauve, Chartreuse, Aquamarine, and Red. It is Red that is the fast colour. It faster than all the other colours. There are many practical and theoretical examples.

Quantum Physics

Consider an electron, which we know to be Green, in a potential function generated by a proton, which is Red. The electron is just a wave packet. Now, as we know, a wave is just a disturbance in a medium. It has no speed. The potential function, however, is called by the symbol V , which can also represent Speed. So, the Red proton has speed, and the Green electron doesn't. Red is faster.

Traffic Studies

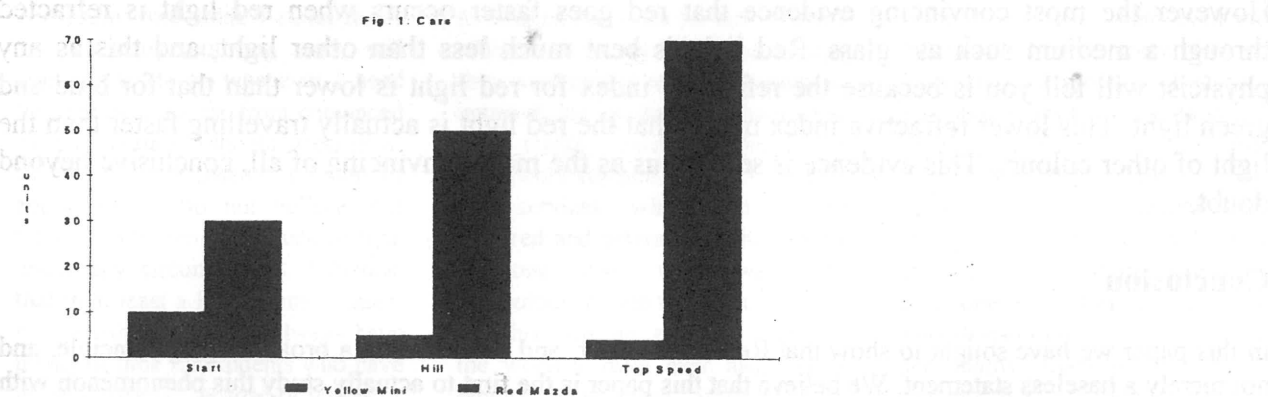
We took a random sample of cars of two colours, Red and Yellow. The cars thus chosen were:

- (i) A Red Mazda 323 Astina
- (ii) A Yellow Mini

The cars were tested for:

- a) Standing Start fully loaded
- b) Hill Climbing
- c) Top Speed

The results are summarised in Fig. 1 below.



Looking at traffic lights and warning signs, we were able to discover the law that **red light travels faster**. This is why the important stopping signs and signals are in Red. It is so that the red light reaches the driver quicker than other light, and so the driver is able to stop in time.

¹This work was partly supported by a grant-in-aid from the Foundation For The Colour-Blind.

²Of the Institute of Yek Herding, Ulan Bator, Mongolia

³University of Ag, Ag City, on a Farm someplace.

Economics and Marketing - Study of flower sales

A random day was drawn from a hat. We used 365 $\frac{1}{4}$ pieces of paper labelled with the dates of the year. $\frac{1}{4}$ of a piece was allocated to 29 February. The random day was drawn as 14 February. The sales of flowers were recorded. See Table 1 for these results.

Flower	Orange Poppies	Blue Daisies	Red Roses
Flower Sales	11	13	317
Proportion	3.2%	3.8%	93.0%

Medical Study

Many studies over recent years that dietary factors can be important triggers to medical conditions. A common childhood condition is that of hyper-activity, where certain child become restless, and have trouble being quiet or staying still, ie they become faster. The most famous trigger to this condition is Red Cordial. We have taken this as further evidence that Red goes faster.

Sport - Squash

It is well known that while all squash balls are apparently indistinguishable, placing a small coloured dot on the ball changes the speed at which the ball travels, and as any squash players know, red dot balls are fast, faster than yellow and green. Further evidence that red goes faster.

Fire Trucks

As is very well known fire trucks are painted red so that they can make it to the scene of the fire. Also many other emergency vehicles, use red lights for extra speed. This use of red lights however goes further. In shops when they wish to hold a fast sale they use a red light to advertise it. This is the well known Red light sale.

Refraction

However the most convincing evidence that red goes faster occurs when red light is refracted through a medium such as glass. Red light is bent much less than other light, and this as any physicist will tell you is because the refractive index for red light is lower than that for blue and green light. This lower refractive index means that the red light is actually travelling faster than the light of other colours. This evidence is seen by us as the most convincing of all, conclusive beyond doubt.

Conclusion

In this paper we have sought to show that Red Goes Faster, and that it this is a broad ranging principle, and not merely a baseless statement. We believe that this paper is the first to actually study this phenomenon with proper scientific rigour, and believe that it is an important field that could lead to many scientific advances. We believe that within the next five years this theory, will lead NASA to paint the space shuttle red, allowing it to achieve escape velocity far more easily. Some people have suggested that the placement of stripes on a red object will make it go faster still, however we believe (open-minded as we are) that this is a ridiculous notion, and not worthy of study.

CAPITALIST EXPLOITATION REVEALED:

Tutoring - The Scam Uncovered!

by Bryan Gaensler

If you are reading this, there is a fairly good chance you are a science student, and that you study at least one of physics, maths, chemistry, or some other subject which carries on straight from the HSC into first year university. If this is the case, then there is also a good chance that you have had at some stage given a friend or a friend of a friend, or even a complete stranger, some help as they struggle their way through the pitfalls of 2 unit physics, 2 unit chemistry, or the hierarchy of HSC mathematics. While tutoring high school students is a prime source of income for the average uni student, the profession, in my opinion, is strewn with pitfalls. Not only is the whole concept of tutoring, quite frankly, a complete waste of time for the student receiving tuition, but quite often the tutor is being taken for a ride too.

Having performed well in the HSC Circus, my time as a tutor has been constantly in demand for the last few years. In that time, I have coached well over 50 students, in everything from 4 unit maths to 3 unit Latin. And while I admit that I am currently tutoring and will continue to do so whenever I need the money, I am far from convinced as to its virtues. I should stress now, so that I don't receive a string of abuse, that I do not believe that tutoring is a complete waste of time under any circumstances. I believe that in at least a few common cases, it is worthwhile. I will always have plenty of time for students who have missed material because of illness or language problems, and for those who simply want to learn more, or who want to just cover work before they do it in class. As for students with genuine learning difficulties, that is definitely a grey area. Such students certainly need help outside the classroom, but I do not think it should be from a university student who simply understands the course.

There is a vast difference between the knowledge that us students can impart, and the teaching ability obtained from years of experience which is required to help those with genuine difficulties. But in my opinion, such cases of genuine need might occupy 25% of all incidences of tutoring, and it is the other 75% who are wasting their time and money in seeking help.

The typical student who asks for tutoring is not near the bottom or the top of their year. In fact, even after several contact hours, it is often not at all obvious why they needed tutoring in the first place. Sometimes it never becomes clear. One common thread though is simple laziness or lack of motivation. So many students sit through class after class not listening to their teachers, and then do the same thing on a one-to-one basis with a tutor. One student I took on insisted that I not talk to him, just write everything down for him to read later, while he sat there and did his homework or played his Gameboy! Every few weeks he brought along an assignment which he wanted me to do for him. When I refused, his parents informed me that they were paying me good money to improve his marks, and improving his marks meant doing his homework for him. Needless to say, my services were no longer required and presumably they found someone else who was less scrupulous to help their son.

This was an extreme example, the worst I have ever had, but it typifies many cases. Students don't seem to understand that the key to understanding, especially in the sciences, is doing lots and lots of questions. Students who seem to benefit out of tutoring often only do so because the tutor sets them questions from their text book to do for next week. If the student does all the questions set, then amazingly, their marks start to improve. But

usually they don't do the questions, and can't understand why the tutor seems to be covering things so quickly. Now we have students paying tutors anything from \$15 to \$40 an hour, and for what? To pick some exercises more or less at random and tell the student to do them! If only students realised that they could do this themselves, everyone would be better off. Of course the average student is not going to just decide that they have to do some questions from their text book, unless their teacher has explicitly set them some homework. Perhaps what is needed is more time at school spent on expounding study technique. For as the students who ARE getting the results know quite well, the main difference between them and the strugglers is that they are doing the hard yards at home every night, and the rest aren't.

There are other problems which plague the struggling student. Often parental pressure drives a genuinely weak student to first take on a subject they can't really handle, and then to get tutoring in it, which normally just gets them even more frustrated. I feel sorry for such students - you do your best to try and make them understand, and invariably get the blame for forcing them to drop that subject completely, and for having wasted their parents' money. I will always grit my teeth upon receiving a telephone call from some student who desperately needs help with 4 unit maths. Even for the best of students, it is a difficult course, and quite frankly, if you are really having trouble with it, you shouldn't be doing it. No amount of frantic hand-waving by a tutor, trying to explain the inner details of Argand diagrams or conic sections, is ever going to help someone who would be better off doing 3 unit maths to get through the final HSC exam. The claims by one tutoring college that the student

who topped the state in 4 unit maths did it with their help always makes me raise an eyebrow. For a person of that calibre, I find it very hard to believe that any program of tutoring would have significantly improved their marks. I wouldn't even want to guess why this student attended a college in the first place, but I very much doubt it made any difference to their marks. Of course if YOU are the person I am referring to, and beg to differ, then let me know!

So it seems that HSC students should be on the lookout - I would advise students and their parents to consider carefully whether a tutor is the best option, or if application to studies would solve the problem. But why am I then addressing this to university students? Because you too should beware tutoring, in the guise of the dreaded coaching colleges. In my experience, coaching colleges are invariably little more than a vast money-making scheme for the person at the top. At the college I worked at, I was paid \$17 an hour to tutor on a one-to-one basis. The students I taught actually paid the boss \$25 an hour, so he pocketed \$8 for every student I taught. Take typically 5 tutors working at once, for about 50 hours a week in total each, and the guy running the college was making \$2000 a week, not counting the students he was tutoring himself! While of course he was doing nothing wrong, it is certainly an easy way to make money. It could be argued that while the tutors are not being paid much (I could charge double that much if I wanted), the students are all arranged for them. I occasionally did 8 hour stints of tutoring on weekends, something I would probably not be able to organise on my own. But in my opinion, the whole thing is a scam. Tutors are used for all they are worth. My unwillingness to work awkward hours, and to supply the boss with all the worked solutions which my mother, a maths teacher, had built up over the years, eventually resulted in me being shown the back door.

The students normally used the boss as a buffer between themselves and me, so that if they had a complaint, I would only hear about it

second hand, and the student would be given to someone else usually without my knowledge. Since most of the students were bone lazy and filthy rich, they often requested 2 or 3 hours straight of tutoring, during which I was supposed to wave my magic wand and fix their results. After 3 hours, even the most patient of tutors starts to get a little frayed around the edges, especially when the student is rarely even listening. I was treated like I was on call 24 hours - I would receive a phone call telling me to be there for a 5 hour stint in half an hour, and when I intimated that it was not really convenient, my regular time slots would start to be taken by someone else, while I was told that my students were sick that week.

Colleges these days seem to advertise instant success should you attend their sessions, deliberately playing on the desperation of struggling students. One college even guarantees you a certain mark in the HSC, provided you do the work. The mark they guaranteed for 4 unit maths looked high, but wasn't, when you take into account the scaling that goes on. Of course, I imagine that if you don't achieve the promised mark, you are probably told that you must have not done the work. This college also employs an advertisement on the radio which involves a student chanting in a monotone, "I must go to XXXX College," as if they have been brainwashed, and it is implied that if you do not attend, you basically have no hope at all.

Do you suffer from irregularity?

Can't seem to get regular issues of **Jeremy**, no matter how boring the lectures are?

Well, maybe you need to
CONTRIBUTE!

That's right. For a limited time only, if you contribute to **Jeremy**, we will publish you with minimal editing. In fact, we will pick the best contribution to **Jeremy** and award a prize with each issue.

So get writing.

Quite simply, the whole tutoring merry-go-round is getting quite out of hand. Students are being promised magic results if they pay thousands of dollars to go to these colleges, and tutors are caught in the middle, being paid less than they should to do the dirty work. If you need the money, then by all means tutor, but be warned!

SUBVERSIVE NATURE OF TELEVISION EXPOSED!

[From the *Sun-Herald*, 12-6-94]

Trekkie idea not warped

LONDON: *Star Trek* creator Gene Roddenberry may have been right when he invented "warp" travel as a way for his characters to travel through space, a physicist said yesterday.

Miguel Alcubierre, an expert in relativity theory working at the University of Wales in Cardiff, said he had proved mathematically that "warp", faster than light, travel is possible.

Such an idea violates one of the basic tenets of Einstein's theory of relativity - that nothing can travel faster than the speed of light.

But Alcubierre said in a letter to the journal *Classical and Quantum Gravity* that space could be warped or distorted, giving the effect of unnatural speed.

This would solve one to the main problems of space travel - the immense distances involved meant it would take generations to reach even nearby solar systems.

Reuter

Orientation Week Questionnaire

As part of its obligation to student services, Physoc is conducting a survey of student reaction to O-week, the University, Physics, and Life.

1. What is your chosen name? (eg., Baruba, King of the Island People)

2. Year of study?

3. Did you get this **Jeremy** by:

- ☐ subscription
- ☐ from Physoc stall
- ☐ friend or relative?
- ☐ Theft
- ☐ other, more nefarious means? Please specify.

4. Can a duck swim?

- ☐ Yes
- ☐ No

5. How did you rate the last edition of **Jeremy**?

- ☐ Good
- ☐ Bad
- ☐ Ugly
- ☐ Never heard of him
- ☐ Other. Please specify.

6. Do you think the editors are:

- ☐ Good
- ☐ Bad
- ☐ Ugly
- ☐ Slack, Lazy and Cheap
- ☐ All of the above.
- ☐ One of the above.
- ☐ Other. Please specify.

7. Should this question be omitted?

- ☐ Yes
- ☐ No

8. Is the Pope a Catholic?

- ☐ Yes

If you answered YES, then go to Question 10.

9. If you are reading this question, have you made a mistake?

- ☐ Yes

10. What is your favourite O-week stand?

- ☐ Physoc

- ☐ Physoc
- ☐ E.U.
- ☐ Physoc
- ☐ Liberal Club
- ☐ Physoc
- ☐ SciSoc
- ☐ Physoc
- ☐ Student Life
- ☐ Physoc
- ☐ Other. Please specify Physoc

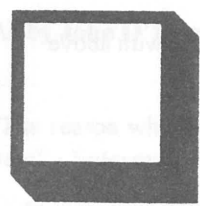
11. If a bear shits in the woods, and no-one is there to see it, does he still need to go?

- ☐ No
- ☐ Yes
- ☐ It depends on the bear
- ☐ Not enough information.
- ☐ Neither state is true until observed.

12. How many fingers am I holding up?

- ☐ One
- ☐ Two
- ☐ Three
- ☐ Two of mine and one of his.
- ☐ That one I found down the back of the garden.
- ☐ Two fish fingers and a lady's finger.

13. Are you blind?

☐  Yes

- ☐ No

14. Do you do Physics for fun?

- ☐ No
- ☐ Yes
- ☐ I refuse to answer on the grounds that it may incriminate me.

15. Which of the following groups have you been hassled by in the past year?

- ☐ Physoc
- ☐ E.U.

- ☐ Student Life
- ☐ E.U.
- ☐ Political campaigners
- ☐ E.U.
- ☐ Wilderness Society koala
- ☐ E.U.
- ☐ Those guys who sell the Green Left Weekly
- ☐ E.U.
- ☐ Spartacists

Check once for each time.

16. Do you own:

- ☐ Young, "University Physics"
- ☐ Zumdahl, "Chemistry"
- ☐ Your own car.
- ☐ Someone else's car.
- ☐ A flashlight.
- ☐ A villa in Majorca.
- ☐ A small South Pacific island.

17. Have you been arrested in any of the following States?

- ☐ Queensland
- ☐ Tasmania
- ☐ Utah
- ☐ drunkenness
- ☐ distress
- ☐ undress
- ☐ euphoria
- ☐ gaseous
- ☐ solid
- ☐ liquid

18. **B.Sc. students only:** What will you do with your degree?

- ☐ Get a job.
- ☐ Become an academic. (Do not confuse with above option).
- ☐ Save the world.
- ☐ Conserve resources by recycling it.
- ☐ Use it for emergency bog paper.
- ☐ Make into an elaborate origami party hat

19. Have you handed this questionnaire in to a **Jeremy** box?

- ☐ Yes
- ☐ No

Competition Note:

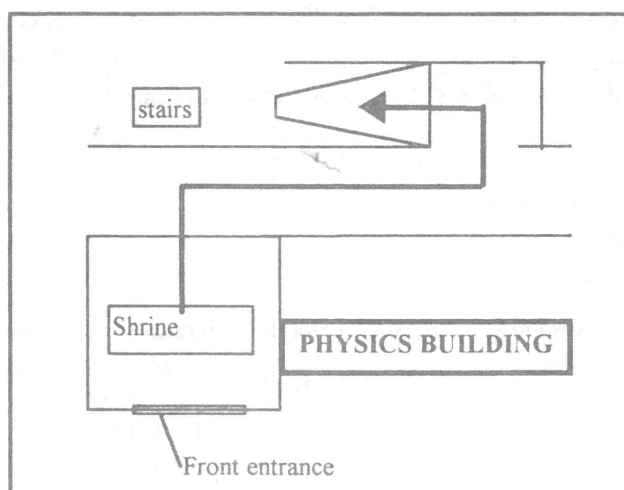
The questionnaire with the most correct answers from each State may win a Prize. SA residents may submit a hand drawn facsimile of these two pages to enter. Only one entry per household allowed in this manner.

Free Coke[®]!

+ \$1.10 handling charge.

Use the **PHYSOC COKE MACHINE** in the basement of the Physics Building. The same price as Union, and no need to show your student card!

Follow the map below to the **PHYSOC COKE MACHINE**. It's down the stairs, and on your left.



NEW PHYSOC

Gets Whites Whiter!!
Colours Brighter!
Teeth More Sparkling!
Just for the Taste of It!
Great on Sandwiches.
Mild on Hands while You do Dishes!
Higher Octane.
Half the Lead.
Removes 99% of household stains.
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Jeremy

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QUOTES COMPETITION

[contributed by *Ariane Hemingway*]

"Why does charge congregate on the point of a sphere?" - **Ian Johnston**

"You have two problems, you have a nozzle, which is a nozzle, and a wind which is a wind." - **Don Melrose**

"If you do it in the lavatory looking over it, you get a dollup in the eye" - **Don Melrose**

"The trouble with me is that I went to a father and son rugby camp on the weekend and the other fathers drank so much that this morning I can't concentrate" - **Lawrence Cram**

[From *Geoff Facer*]

"This is something which can sometimes be proven, but fundamentally cannot be proven." - **Martijn de Sterke**

[From *Sally Teh*]

"I know you know less than I know you know. When I say recall, I mean I recall and maybe you learn." - **Dr Kuo, Pure Maths**

[From *Graham Turner*]

"When you look at your own work you say: 'Gee, that's pretty darn good!' " - **Peter Robinson, talking about self-peer assessment**

"The students complain that the Mathematical Methods course has too much maths..." - **Peter Robinson on student reaction to the course.**

[From the editors]

Darren Gardner (*Physics 3, 1994*): "Some guy has invented a snow machine that works at room temperature."

Matt Hole (*also Physics 3, 1994*): "How does that work? There must be some cooling mechanism involved."

[From *Malcolm Ellis, Physics, 1994*]

"If you wave your hands long enough, the right answer will pop out."

"There are greater mysteries [*than Quantum Mechanics*], one of these is neurobiology"

"You can define the number of elbows on an electron... and find the mean number of elbows."

"I don't mind, as long as you don't snore!"

all by **Peter Robinson**

"This is not me, it's a pizza!"

"...which leads to the inevitable question — is there intelligent life on earth?"

"Despite being very faint, Pluto is always easy to find in the sky because it has this bloody big arrow pointing to it."

"The distance to Canberra is now 1mm. If that doesn't scare you, nothing will."

"Astronomers are fundamentally strange people."

"He discovered the planet Uranus. That's enough to get you fairly well known."

"That would be a reasonable question... and I don't have a reasonable answer."

"People saw figures in the sky. They must have been blind drunk at the time."

All by **John O'Byrne**

"The reason why we chose the gcc compiler is because it's free!" - **Suleyman Sevinc, Computer Science**

"You can grit your teeth and pretend that the complex numbers are just not there." - **Gordon Monro, Maths.**

Pearls from swine?

Sitting in a lecture dozing when a pearl drops from the mouth of your illustrious lecturer? Friend? Pet hamster? Send it in to **Jeremy** and take part in the

[INSERT SPONSOR HERE] Quotes Competition

Prizes galore, and your name in print.

Welcome to Physics 4-UM once again. Its great to see you all merrily puzzling away. I've had such a wonderful response from many of you that I can sit back and fill the 4-UM with your answers and new questions. One reader, Geoff Horne draws on his wide experience as a Mechanical engineering student and a bartender to explain some baffling puzzles and come up with a few fresh questions too. Keep it up everyone! Remember there are prizes/bribes. An answer or new conundrum will entitle you to free entry to the next Physoc party.

Slamming Doors

I've had lots of responses to this one. I'm sure you all remember it. The question is simply why is it easier to shut the door when the window is open. While most of you smiled secretly to yourself, faked a Julius Summer-Miller voice and pronounced the words *atmospheric pressure does the work*, David Mar decided to spend an enjoyable afternoon slamming the door of his office. Here's what he found:

"Not only have I solved Bryan's first problem (the doors being harder to close with the windows shut) but I have done some rough calculations.

The effect is caused by the increased air pressure inside the room as you swing the door shut. If we assume the door sweeps a volume of 1 m^3 , and all of that air is pushed into the room, we can work out how much extra force you need to close the door.

I measured my office, it's about $2.5 \times 3 \times 4 \text{ m} = 30 \text{ m}^3$. So the increase in air pressure inside is $1/30$ times atmospheric pressure, which is $\sim 100 \text{ kPa}$. So the pressure in the room is about 3.3 kPa higher than outside. Over a $\sim 2 \text{ m}^2$ door, this gives a force of 1.7 kN , equivalent to the gravitational weight of a 170 kg mass!! It's not surprising the door should be harder to shut!

The only dodgy assumption is the amount of extra air swept into the room by the swinging door. It's probably less than 1 m^3 , but even a tenth of that still gives an excess force of 170 N , or an equivalent weight from a 17 kg mass - which is substantial."

Through the Magnifying Glass

The sun was shining on the sea

Well maybe not the sun, but a black body radiator, and maybe not the sea either how about we use a magnifying glass? Remember the paradox? We have two black body radiators, one twice the area of the other, pointing at each other through a magnifying glass.

In the last issue of *Jeremy* we published Neil Broderick's solution to this puzzle. But it seems we cannot escape the paradox so easily. Several readers pointed out that this solution won't work. Kieran Larkin (from Physical Optics), points this out and goes on to explain away the paradox himself:

"The solution proposed by Neil Broderick has a fishy odour not unlike that of the red herring. As a solution it fails completely when it comes to quantitative predictions.

To be more specific, the proposed system would not violate any laws of thermodynamics even if the lens were 100% transmissive. The crucial quantity to consider when analysing the problem is the power emitted per unit area per unit solid angle. This quantity is known as the **radiance**.

Kieran continued on to give a very thorough argument to show that the radiance of each of the black body radiators is equal. His argument hinges on the observation that for small angles, the radiation from a black body radiator of area $2 \times A$ is collected by the lens over a solid angle of Ω . This radiation is then focussed down onto area A , over a solid angle of $2 \times \Omega$. So since the radiators emit the same power, they have the same radiance and hence the same temperature too!!!

A few physics 4-um questions/answers

By Geoff Horne

1.0 Firstly I have some questions:

1.1 Why does glue set better in cold conditions?

1.2 Why don't the pens at bank counters ever work?

Now to some answers:

2.0 Springs and Things:

I don't claim to be an expert on the subject, but I have a few ideas. My Mechanical engineering training taught me about such things as pre stressed concrete. To make these objects, what you did was take a lot of steel and place it under tension (i.e. stretch it) and then you poured wet concrete over this stressed steel and waited for the whole shebang to set. Once it had set, you released the tension on the steel and it would COMPRESS the concrete. This resulted in a concrete with a higher internal energy. In turn this supposedly meant that the concrete more resistant to stress and thus made it harder to bend.

I think that a similar effect will happen with the spring, by setting it under compression it will affect the internal energy of the concrete. So when it is dissolved this energy will be released resulting in a heating of the acid. What our friend the chemist should notice as different between the two samples (one with and one without the spring) is that acid in one will be hotter than the other.

3.0 Recycling

For the answer to the bottle/water question I refer to my experience as a bartender. The simple answer the question is: Air Pressure. However, to be more detailed, as I know physicists love to be, the correct answer is that 'the water hiccups as it comes out of the bottle entirely due to coincidence', viz:

The opening of a softdrink bottle is approx 2cm across. This gives it an area of 3.14 cm^2 . A milk carton has an opening that is roughly square, 4cm to a side and thus has a cross sectional area of 16 cm^2 . The milk carton thus has an opening that is 5 times larger than the bottle. Now, one of the challenges of a good wine waiter it avoid making a wine bottle hiccup, splashing red wine in the customer. As any good wine waiter will tell you, the way to avoid this is to simply 'keep the bottle level' i.e. don't tip the thing upside down. But why you ask? Well this is where the air pressure part of our solution comes in. In order for the bottle to empty we have to satisfy the law of 'conservation of volume', this is an entirely bogus law, but in essence it means that 'nature

abhors a vacuum' - if we are going to remove the water from a bottle, we have to replace it with something - namely air. This air, however, has to get into the bottle.

So we have a problem in that while the water is leaving the bottle, the air has to get into the bottle through the same hole. In a milk carton the across sectional area is large enough to let these happen simultaneously, but in the case of a bottle, especially if it is turned upside down, the water is effectively 'blocking' the hole and the air can't get in. Eventually, however, the pressure difference is so high that the air pressure is greater than the water pressure and it 'hiccups' into the bottle.

To see how this works try the following: (hey kids, it's experiment time)

Fill a bottle with water and SLOWLY turn it upside down (with the lid off). What you'll see is that the water will pour out neatly for a while but, once you get it past a certain angle, it will then start to 'hiccup'. At this point you should also notice that the water is entirely blocking the hole.

Next, repeat the experiment but place a small hole (~0.5cm) in the side of the bottle. Now rotate the bottle keeping the hole to the top. This time the water should flow smoothly, regardless of the angle, as the air will be entering from the hole in the side.

This problem of air pressure is also why you are supposed to open both ends of a 'TetraBrik' carton - to allow the liquid to leave through one hole and the air the enter through the other. This is also why the door (part 2 of the question) is hard to close. The movement of the doors will cause a pressure difference (if you do it fast enough). If the window is open, there is an opening through which air can pass. If there isn't an open window, the air will have to enter through the doorway, making it harder to close the door.

Geoff (horne@suphys)

Jul. 29 1994.

Physics by Candle Light?

I leave you with a final puzzle to keep your brains buzzing till next time. This one comes to me from Mike Steel:

"This is a question about the optical properties of candle wax. The answer is certainly known, just not by me!

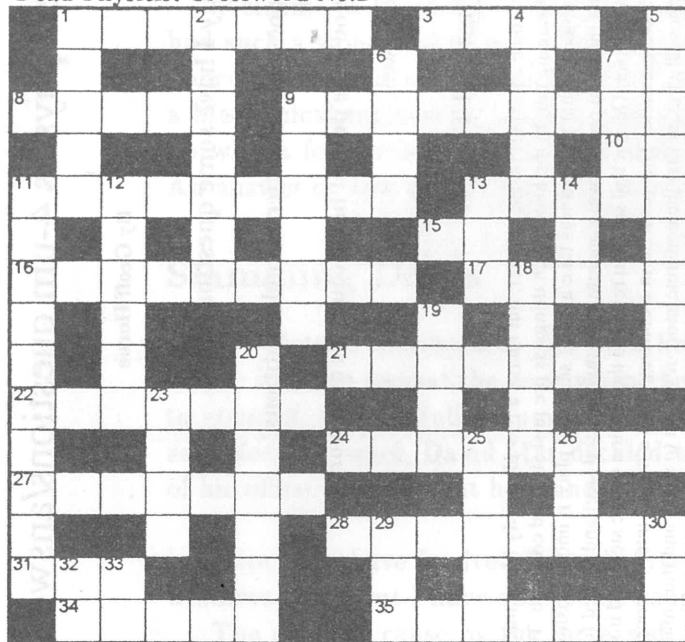
Solid candle wax is a slightly translucent material with a normal penetration depth of a few millimetres. For greater distances the solid scatters light so strongly that virtually none gets through. If melted in a saucerpan, however, wax becomes totally transparent with no noticeable loss.

Wax is made of long chain hydrocarbon molecules, so that in both the liquid and solid state the structure is reasonably disordered. In both states the bonding is the same—weak intermolecular forces, which are long lasting in the solid and transient in the liquid state.

What then is the explanation for the dramatic change in the optical behaviour at the phase transition? You may care to contrast the behaviour in water for which both the solid and liquid states are essentially transparent."

THE ALL NEW DEAD PHYSICIST CROSSWORD!

Dead Physicist Crossword No.2



Dead Physicist No.2

Across

1. Physicist d. 1962
3. Physicist d. 1970
7. 666 Kg.
8. Physicist d. 1958
9. Physicist d. 1908
10. Once a unit in physics.
11. Physicist d. 1960
13. Physicist d. 1894, 1975
15. Unit in physics.
16. Physicist d. 1907
17. Rays.
21. Physicist d. 1953
22. Physicist d. 1923
24. Physicist d. 1856
27. Physicist d. 1940
28. Physicist d. 1988
31. How not to drink beer.
34. Physicist d. 1984
35. Physicist d. 1827

Down

1. Physicist d. 1906, 1934
2. Physicist not dead.
4. Superman.
5. Physicist d. 1906
6. Curse of the single physicist.
7. Experiment.
9. Physicist d. leaving series
11. Physicist d. 370BC
12. Physicist d. 1899
13. Old woman.
14. Unit in physics.

18. Good Japanese comic.

19. Where physicists find their sex tips.

20. The nature of women. (more than one answer possible)

23. Unit in physics.

25. A style.

26. Deoxyribonucleic acid.

29. Unit in physics.

30. Creationist's ability to reason.

32. The instinctive mind.

33. Constant in physics.

Dead Physicist Comp

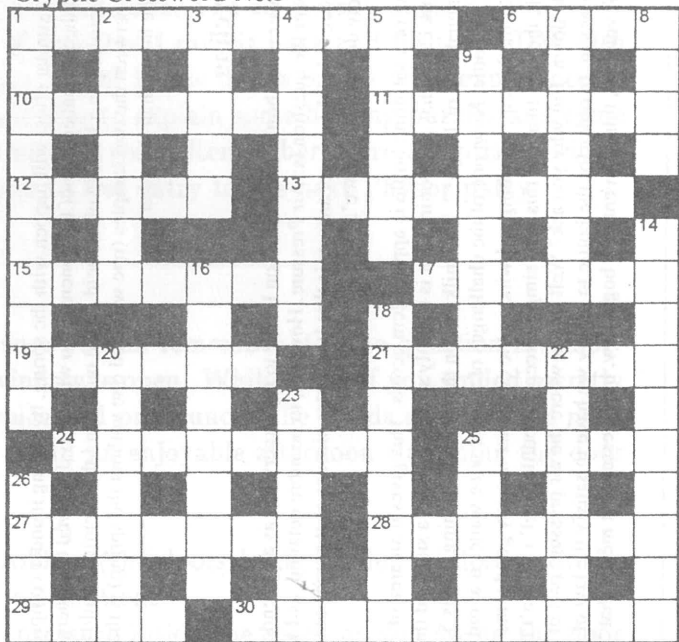
Again, the best solution to be handed to a Jeremy box by next issue's deadline wins.

Cryptic No.3

Across

1. Reciprocated between two to determine the right way to attend rice. (10)
6. The safari crossed a huge distance. (4)
10. Trifling with three glasses. (7)
11. Order it acted. (7)
12. Scribbles down some music. (5)

Cryptic Crossword No.3



13. A first timer makes the men cower. (8)

15. Americans and I sin madly. (7)

17. School boy in agreement. (6)

19. Mr Odin upset at the thought he wasn't the first great hunter. (6)

21. Champion with a century looks east for a solvent. (7)

24. Decisive state of patient. (7)

25. Spirits conjured up disc jockey in Nigeria's capital. (5)

27. Companion swindles or tricks his leader. (7)

28. No age is made to suffer. (7)

29. Ride around the urgent. (4)

30. Donkeys son meant for test. (10)

Down

1. Tin Tin's one who hides what his purposes are. (10)
2. You really warped that dance Edward?(7)
3. Destroys what remains. (5)
4. Cape Old, a cape for warmth. (8)

5. Gives an end to painful cries. (6)

7. Roman priests burn Nicholas Spratt. (7)

8. Lou can't play his sax without one. (4)

9. Forage around for a Cure song. (8)

14. Tin men rent an unpleasant confinement. (10)

16. To take a child as a proposition for parliament. (8)

18. Story of great or dubious value depending on the reading. (4,4)

20. Seamen sings an ancient rhyme. (7)

22. Cow fish I see endlessly will rust. (7)

23. The Schutz-Staffel surrounds cute coins or body plates. (6)

25. Opening portals reveals 70s super group. (5)

26. Around half of all decimals froze. (4)

Jeremy

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The Young and the Rest-mass (A Soap Opera of space-filling proportions)

To those of you who have not yet encountered our sexually frustrated (ie. physicist) heroes, we provide a brief introduction and synopsis of the previous episodes.

Episode 1: A.L.I.E.N. Alert

The staff at the Big Universal Radio Photometer are searching for Extraterrestrial Life Visible In Sky. Among them are Dr. **Ray Lee Criterion** and his young PhD student, **Spark Station**. Dr. **Di Vergence**, the young and beautiful research fellow, tries to publish her results of alien messages. Prof. **Aliena Masque**, the director, refuses.

Episode 2: The Beast Within

Di uses the Synchronised To Outerspace Message Analyser (Cryptic Homogeniser) to decode another alien message. She is stopped by Aliena. Di's assistant, **Beth L. Function** looks longingly at Spark. Spark looks back. Boom! Spark, Di and Beth leave Dr Criterion to walk around the photometer. They see a strange light in the sky, and Beth disappears. Spark is about to confess something.

Now stay tuned for Episode 3:

ELVIS Lives

"Di...I...I..." Spark stuttered uncertainly but was abruptly cut off.

"What was that?" Di exclaimed her eyes wide with terror.

"I'm not sure," Spark replied, "but I think we better go and check it out." He clasped Di hand firmly and led her back to the photometer.

The pair burst into Dr Criterion's darkened office. "Dr Criterion?", Spark called out as he entered the room. "get the lights Di." Spark commanded.

The fluorescent lights blinked on filling the room with light. "Oh look Spark!" Di exclaimed, pointing at the Doctors white board. A series of equations had been furiously scribbled across the board, and ended with a line trailing down the board. "What does it mean Spark?" Di asked.

"How should I know?", Spark replied, "You're the one with a PhD in Alien languages." However as Spark was saying this a low moan came from behind Dr Criterion's desk.

"Aaah!!" Di screamed shrilly, "Aaah!"

"what is it Di?" Spark exclaimed, as he rounded the table to see Dr. Criterion's Mangled Half-Eaten Corpse.

"Aaah he's dead!" screamed Di.

"No I'm not," said a weak voice, coming from Dr. Criterion's mouth.

"Aaah!!" screamed Di "He's Alive!"

"Shut up and stop screaming Di! And listen to what I have to say!"

"What Dr Criterion" said Spark peering intently at his missing legs.

"I was eaten by an alien..."

There is an alien in the Photometer, and it's name is...A...Al...Ali...Aaaahhh!", Dr Criterion gurgled as he died.

A short time later. In the Photometry Directors office.

"Professor Masque!!", screamed Di, "Dr Criterion, has been eaten by Aliens!!!!"

"And what do you want me to do about it?", Aliena replied coolly flossing her teeth. "Pah Yuck! That meal was Horrible, sinewy. Anyway don't you realise that any sensible alien wouldn't eat a tough old man like that."

"But don't you realise this means anyone of could be next!", said Di distraught, "Also Beth was taken by a strange light."

"Well I'm not worried, and I'm sick of this pathetic whingeing, Dr. Criterion has probably just been attacked by the photometer guard dogs, and if Beth doesn't return by 9:00 am tomorrow she'll be fired!", Aliena said menacingly flexing her shoulder pads, "Now get out of here!"

Later the next day....

"Di, Di!!", Spark cried rushing into Di's office, "I think I know how to decode the message that Dr Criterion was working on!"

"What does it say?", Di replied.

"Well it doesn't make any sense. It's like the other messages. The decoding system seems fine but all it does is produce is. -YT SATYR E VSN AMUH MUYM UY' I think the problem is that we don't know what language they speak."

"Yes", said Di, "Of course we were assuming they spoke English!"

Just at that moment a shadow fills the doorway. "Goot mornink, my friends, it said". The sinister figure limped slowly into the light clutching his cane in a thin claw like hand. The fluorescent light gleamed off his black leather jacket and vinyl eye-patch. Beneath the low brimmed hat appeared a familiar face...

"DR CRITERION!!!" exclaimed Spark as Di fainted into his arms.

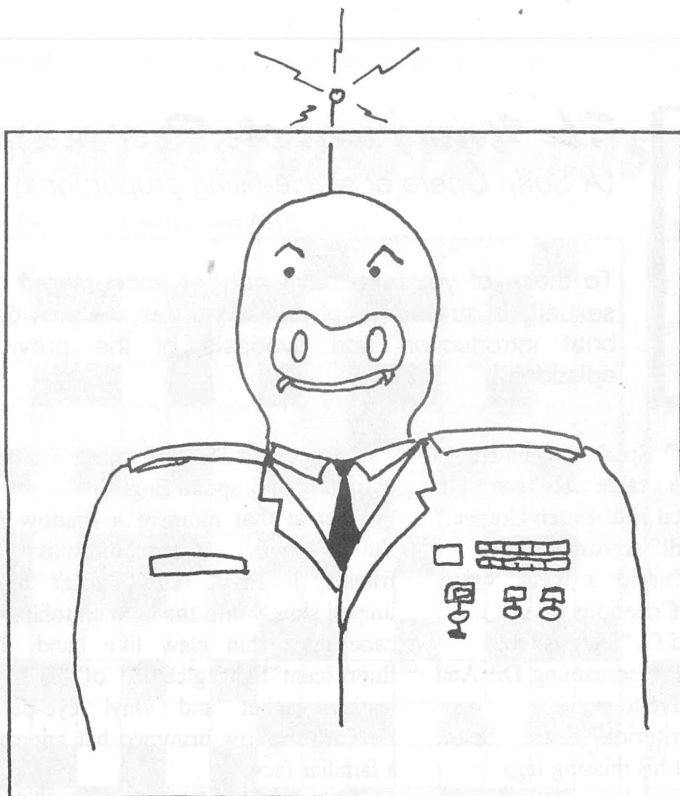
"Nein, Nein," said the figure, "I am not Ray Lee Criterion, but his evil twin Herr Professor Doktor Nyquist Criterion. I heard of my brother's death and thought there might be a job opening. Jobs for research physicists are hard to find."

What does Nyquist Criterion want? Why is he German? Will our heroes ever decode the messages? Will they all be eaten before they can? How does Aliena flex her shoulder pads? Where is Beth? What is Spark's guilty secret? What is the significance of this episode's title? Why are you reading this? Is the lecture that boring? We can go on all day if you want!

So tune in next time when you will hear Dr. Criterion say

"Hey Di! want to see my big expansion.....for Pi"

This Space is Intentionally Blank



The **Jeremy** ***BACK*** ***PAGE***

This issue of Jeremy was brought to you by the letters A, K and the number 47.

It was produced under extreme duress by editors seeking to give up their jobs at all costs.

Thanks to:

- New editors, whoever they may be.....
- the UNION and the SRC for the \$
- the students for supplying \$ to the UNION and the SRC
- Nick Spratt for another twisted Dead Physicist X-word
- Arms dealers the world over.
- Sean Yates for being as slack, lazy and cheap as us.

No thanks to:

- The letter M and the number 16, for jamming at the worst possible moment
- all those who didn't contribute
- scum sucking capitalist swine the world over
- the guy in the express lane at Franklins who always has 25 items.