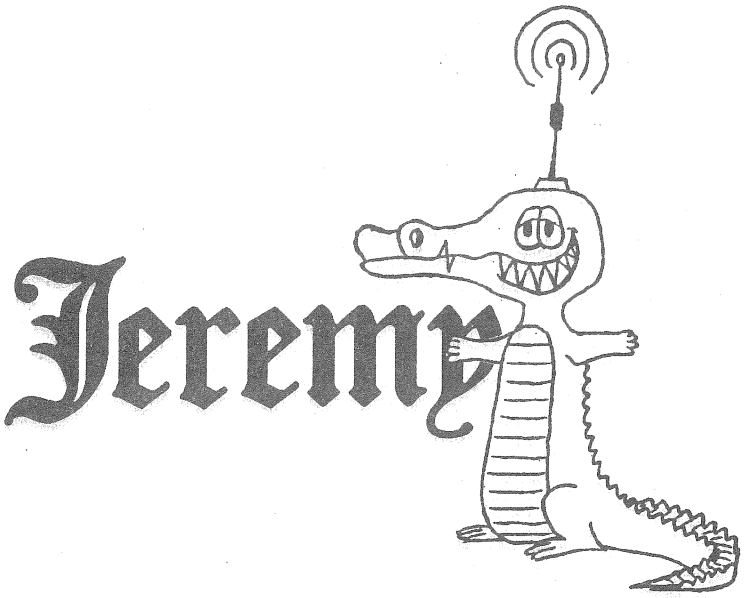

The Official Journal of The University of Sydney Physics Society

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Editorial

Well folks, we just made it. As we write this, there are only eight hours to go before this issue gets sent to the printer, finished or not. So we're going to write this editorial as quickly as possible and then get some sleep.

Someone (Leon Poladian, a theoretical postgrad) has finally noticed that there was never any *Jeremy*, Volume 4. This is *Jeremy*'s fourth year of publication, yet we are up to Volume 5. The reasons for this are many and varied, but mostly hinge on the fact that we can't count.

This is the largest issue of *Jeremy* ever published. A substantial amount of the blame can be laid upon Cathy Foley and Lawrence Cram, for generating a stupendous number of idiotic utterances. The *Kit-Kat Quotes* section is a full six pages long. The action-packed finalé of *The Hitch Hikers Guide to The Physics Building* appears within, along with Bodie's latest *Physics Forum* (hopefully — we haven't received his manuscript yet). In our continuing service to enlighten first years, we offer a third year's explanations of some of the *Fundamental Laws of Physics*. Unfortunately, all this leaves little room for any other main features (or fortunately, for us, because we would have to write them).

This is an unsubtle hint that we would like some more article-style submissions. You are probably sick of seeing our names on every second article. So are we. Surely there is someone out there with more creative talent than us. There must be! We thank the few who have submitted material so far this year, notably Bodie Seneta, Andrew Sykes and Derek McKay. If you want to see your ego in print like us, now is your chance. There is still time, since this is the penultimate issue of *Jeremy* for 1989. So when you are thinking of excuses to avoid doing that assignment, write something for *Jeremy*. It may not help your assignment, but at least you won't have to fudge over your ignorance.

Well, we're nearing the end of this editorial and there are now only seven hours to press time. We are going home. We hope you have at least some time to do normal person type things over the mid-semester non-lecture period (there is no such thing as a holiday in fourth year). After all, there's more to life than physics . . . so we are told anyway. So good night, and we'll see you in the final issue, if we survive until then.

The Editors: Kim Lester (Physics IV, High Energy Physics)
David Mar (Physics IV, Astrophysics)

J

Nazi Space Nuns Overrun Suburban Nudist Colony!!!

It hasn't been all that long since the last issue of *Jeremy* appeared in the lecture theatres, but the Physics Society have certainly managed to squeeze in a lot of activity between then and now. There have been three lunchtime lectures, the first given on the 2nd of July by Dr Michael Box of the University of New South Wales. Dr Box told us all about *The Greenhouse Effect and The Ozone Hole*, outlining the reality and seriousness of the environmental problems that we now face. The large attendance and many questions asked showed how interested and concerned people are about these issues.

The Society managed to organise a major coup by arranging for Jeff Watson from the *Beyond 2000* television programme to give a lecture on the 30th of August. Although Jeff is usually a highly paid speaker, he agreed to talk to us gratis. He found, however, that he wasn't going to get away that easily — University Security charged him $2 to park his car on the University grounds. Despite this monetary setback, Jeff entertained an enrapt crowd with anecdotes accumulated over his many eons in the science reporting field.

Searching farther afield, the Society ensnared A./Prof. Ted Fackerell of the Grand Order of Applied Mathematicians to deliver a dissertation on *Black Holes* on the 13th of September. Having safely sent the first years into shock with a relentless barrage of tensor equations, he proceeded to explain some of the more interesting aspects of this captivating field.

The Informal Discussion Groups were back, commencing with a guided tour and slide show through the world of fundamental particles and particle accelerators on the 10th of August, with Prof. Laurie Peak as the tour guide. Dr James McCaughan delved into the philosophical side of quantum mechanics on the 17th of August, and showed that philosophy can shed a new light on our understanding of life, the universe and most of the rest of physics. The benefits and problems of solar energy were explored by Dr Bernard Pailthorpe on the 31st of August, emphasising the future prospects for the exploitation of this almost limitless resource. A wet, wild and squeaky clean time was had by all who attended Dr Brian McInnes' interactive soap bubble extravaganza on the 14th of September, after which most of the people present stayed back to play with the bubbles, despite having labs, lectures or tutes to go to. The amount of fun experienced can be gauged from the one and a half hours it took to clean up the resulting mess.

Dr Paul Walker is conducting a series of three coaching seminars, expanding on last semester's *How To Learn Physics (And Even Pass Exams)* discussion group. The first was held on the 7th of September and the others will be on the 21st of September and the 19th of October. These are aimed at helping students improve their learning techniques. Even if you missed the first one, don't be afraid to come along to the other sessions.

Party Press:

The *Farewell Voyager 2 Party*, held on the physics back lawn at lunchtime on the 6th of September, was a smashing success, despite the absence of the guest of honour. The sunny weather coaxed more than fifty people outside for the festivities. Everyone seemed to enjoy themselves and looked forward to the next one. Watch for the posters after the mid-semester break.

Exams + Solutions!

The Society is planning to have ready for sale after the mid-semester break, a selection of undergraduate exam papers with worked solutions (sorry, past years only). This is a serious announcement, so watch for further details.

T-Shirts!

We hope to have some new Physics Society T-shirts printed very soon, as the old stock has almost run out. No design has been finalised (or even thought about), so any creative minds out there are welcome to submit their ideas.

J

THE PHYSICS SOCIETY MAILBOX IS LOCATED BEHIND THE DOOR TO THE SCHOOL OFFICE FOYER, NEXT TO THE STAIRS, OPPOSITE LECTURE THEATRE 8.

Fundamental Equations and Laws of Physics

by Andrew Sykes and the Eds.

By now, any first years who have managed to survive this far into the year will have noticed that almost everything that they have learnt as a preparation for studying physics at university has been more or less thrown out the window. By the time one reaches third and fourth year, most physical quantities and equations will have been updated, redefined and expressed in more and more obscure systems of units.

To save the junior students a lot of time and trouble, we list below some of the more important fundamental equations and laws that you will need to know and will learn and appreciate more and more as the years go by.

Newton's First Law of Motion:

Paper planes tend to land where the lecturer can see them.

Newton's Second Law of Motion:

Holidays take place in an accelerated frame of reference.

Newton's Third Law of Motion:

For every amount of effort that a lecturer puts into setting up a demonstration so that it will work properly, an equal and opposite resistance to working properly is felt by the demonstration.

The Special Theory of Relativity:

Any lecture handouts disappear at a rate approaching the speed of light. The highly relativistic effects that come into play mean that, no matter how many extra handouts the lecturer prints, there are never enough and someone always misses out.

The Time Dilation Effect:

If the speed at which a lecturer plies his or her students with incomprehensible material is v, then the apparent duration, t, of the lecture is given by

$$t = \frac{t_o}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$$

where t_o = true lecture duration (i.e. about 50 minutes)
c = the speed of light.

The Mass Increase Effect:

The apparent weightiness of the course material is also dependent on the lecturing velocity, a multiplication factor identical to that for the time dilation effect being introduced.

The Length Contraction Effect:

The height to which bored students slump on their seats during a lecture is also velocity dependent, given by their true height multiplied by the reciprocal of the time dilation factor.

The General Theory of Relativity:

The fabric of space-time is distorted by the presence of assignment deadlines, so that no matter how long you have to complete an assignment, every last minute of your spare time will be required to get it finished before it is due.

Spontaneous Decay of Laboratory Notes:

The lab notes for all years are, as everyone knows, fully revised and updated every year. Although any mistakes and omissions are thus rectified, an equal amount plus half again of new mistakes and omissions is introduced to the notes in this way. The more vital sections are preferentially affected, as their heavy nature leads to increased instability.

The Zeroth Law of Thermodynamics:
Second year electrical engineers will do thermodynamics.

The First Law of Thermodynamics:
No matter how much extra work you do, nor how much extra time you put in, the exam will always be too difficult, according to the equation

$$\partial(\text{exam difficulty}) = \partial(\text{work}) + \partial(\text{time}).$$

The Second Law of Thermodynamics:
Every lecture will lead to greater confusion. The confusion of the system (of students) thus tends to a maximum, usually at exam time, known as the *entropy death of the (student's) universe.*

The Third Law of Thermodynamics:
The textbook (for courses at any level) is incomprehensible except for the sections which aren't in the course.

The Pauli Exclusion Principle:
Whatever level of physics you are at, the most important section of theory, absolutely vital to the successful completion of your experiment, has been excluded from the lab notes.

The Heisenberg Uncertainty Principle:
The requirement that the product of space and time uncertainties is greater than $\hbar$ manifests itself in the fact that when you know exactly when your assignment/report is due, you can no longer remember where it has disappeared to. Conversely, as soon as you know exactly where the work is (i.e. safely in the lecturer/demonstrator's possession) you do not have any idea whatsoever as to when, or indeed if, you will ever see it again.

Conservation of Laboratory Time:
In first year, if you put your mind to it, you can finish the majority of experiments in two hours, i.e. $^2/_3$ of the time allocated.
In second year, with a little work, you can finish an experiment in two weeks and still have about an hour left over. This is $^3/_4$ of the time allocated.
Consequently, by third year you have a large excess of spare time built up and, by the principle of conservation of (undergraduate) laboratory time, you end up spending over nine hours a week in the lab, which is two more than allocated.

Bernoulli's Equation of Fluid Flow:
The number of students in morning lectures is given by a complicated equation incorporating the types and quantities of fluids consumed the night before. There are so many variables (V.B., Tooheys, Fosters, Nescafé, Bushells, Coca Cola, etc) that only the most basic form is ever really used. The number of students present, N, is given by

$$N \approx S - 0.5E - 0.9A$$

where
S = number of students in class,
E = number of engineers in class,
A = number of arts students in class.

The Resonance Condition:
When a lecturer breaks a piece of chalk on the board, the resulting high pitched noise is of exactly the right frequency so as to cause a maximum of discomfort to the students' ears.

Archimedes' Principle:
When an engineer is immersed in a liquid, he or she is buoyed away from physics lectures by a force proportional to the volume of liquid consumed.

The Hall Effect:
Anyone caught in the hallway outside a lecture theatre when the students come out is subject to a perpendicular force proportional to the charge state of the students and their velocity of movement.

Ohm's Law:
The resistance a student feels to going to lectures is equal to his or her potential end of year mark divided by his or her current performance level.

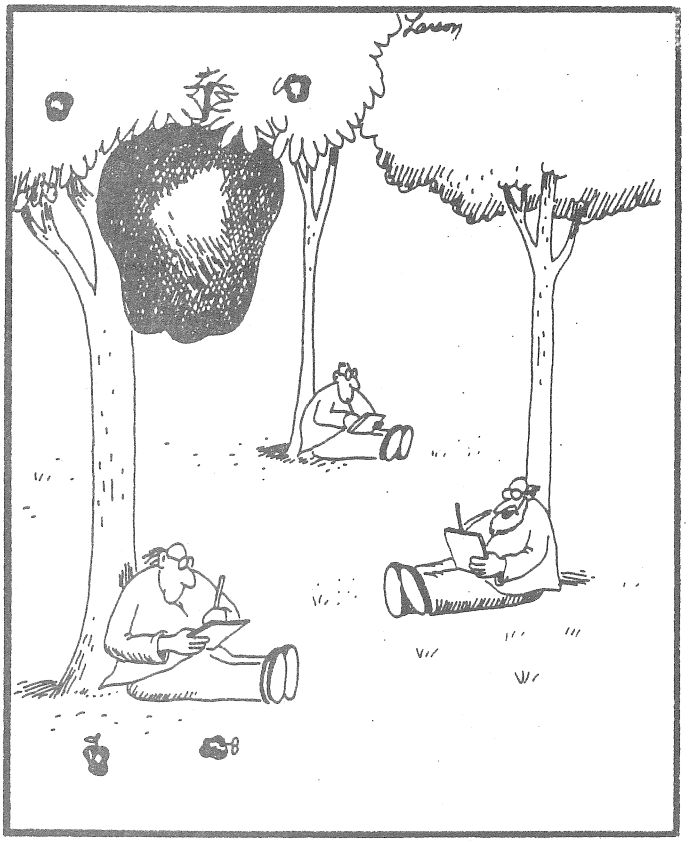
The Doppler Effect:
When you approach a lecturer's office for help with tutorial or assignment questions, the lecturer is Doppler shifted away from his or her rest position (i.e. the office).

Faraday's Law of Induction:
The potential of a student to fall behind in his or her work is proportional to the rate at which assignments are handed out.

The Law of Reflection:
The obscurity of the lecture material is reflected in the exam results.

If anyone out there knows of any fundamental physical laws that we have overlooked, please send them in so that we may publish them and share your insights into the physical world.

J



"Nothing yet . . . How about you, Newton?"

Acknowledgements

The editors(i.e. us) would like to thank those who have contributed to the publication of *Jeremy*.

Beyond Limited, the producers of *Beyond 2000*, have donated $100 towards the printing costs.

The physics academic staff have each contributed $5 for the same purpose.

Finally, we must give our heartfelt thanks to Kathryn Collins for putting up with us and letting us use her Macintosh.

J

Physics Forum
by
Bodie Seneta

It appears that some of the mysteries in this column are doomed to remain unsolved. I still haven't received a word about the bits of chalk dust floating down the blackboard, and not even the incentive of the Drover's Mate flick knife has been enough to get a response about the water droplets skittering on the surface of the puddle. Is there just a general apathy out there, or must I offer something more valuable as a prize?

On a more positive note, my question last week about the glow-in-the-dark stuff that gets *dimmer* when light is shone on it has provoked quite a lot of interest, particularly in (of all places) the Astrophysics Department. Alan Roy commented with respect to the last issue that I was doing quantum mechanics with a T-shirt.

In terms of more useful feedback, Anne Lustig tried to duplicate the experiment with a red-filtered torch she has. We astronomers and astrophysicists like such devices because they allow us to look at charts and such-like when we're out using telescopes without ruining our night vision. She didn't succeed and thought maybe the part of the glow-in-the-dark stuff that I covered up glowed brighter because light it emitted was reflected back onto itself so it didn't lose so much energy. So I went back to my experiment to see if this was the case. It isn't. I tried shining red light onto one part of the phosphor without covering the other part up and still found a decrease in intensity. Allow me to go into the experiment in a little more detail to prevent further confusion:

My light source was a high intensity (two candela in fact) red LED, wired up to two penlight nickel cadmium batteries. The LED can be bought from Tandy Electronics for $2.50, but I think any bright, more or less monochromatic red light will do. In particular, a helium neon laser works pretty well. In order to get a significant dimming of the glow-in-the-dark stuff, I had to concentrate a lot of LED light onto a small area. I did this by holding up the LED against the phosphor for about half a minute while looking the other way so that I didn't get any after-images on my retina. Then, to make sure it was the LED light causing the dimming, I did the same experiment with the flashlight off and found no dimming had occurred. With the laser, of course, there is no problem.

I suspect where Anne went wrong was that her light source wasn't concentrated enough. This might be cured by using a lens in front of the flashlight. Another possibility is that the filter might not be selective enough; that is, some wavelengths that make the phosphor glow more brightly might still be getting through, whereas an LED or laser has an inherently narrow spectral output that does not require filtering. The next stage in the research would be to examine the output spectrum of the LED and the emission and absorption spectra of the phosphor with a spectrum analyser. Any takers?

I was going to offer a Kit-Kat as a prize for this one, but seeing as nobody wants to talk about water droplets I'll do even better. This issue's prize jackpots from that of last issue. The first person who submits a reasonable explanation as to why a piece of glow-in-the-dark stuff should glow more dimly when I shine red light on it will get a Kit-Kat *and* the Drover's Mate! Now who could reasonably refuse such a double temptation?

Now on to this issue's puzzles. They both have to do with the Square in front of the Physics Building.

The School of Physics Lake

There were several occasions during the year when it rained so much that the Square became something of a lake, being completely covered by a sheet of water. When the water drained away, it invariably revealed a complex pattern of debris on the sodden field. It made the Square resemble a full-scale contour map of itself. What could the physical mechanism possibly be that produces such a complex pattern? Now those people who maintain the Square go to a lot of trouble to ensure that it is flat, so if it is differences in elevation that cause the contours, the mechanism must be pretty sensitive. If the contours do not represent elevation, then what are they mapping out? The Square can't be all that different from one place to another, so it looks as if we have very small differences producing major differences in debris distribution. Does this mean we are looking at an example of chaotic behaviour? (To answer that we would need to fill the Square twice and see if the resulting patterns are identical. I don't think the staff down there would like that.)

Frisbees

When the Square dries out, students like to play Ultimate Frisbee on it (provided that they, too have dried out). Many of them are Physics students. I am therefore treading on dangerous ground here because there's bound to be students who know a lot more about this than I do. If I blunder, please feel free to write in and tell me.

The stability of a frisbee in the air is due to its gyroscopic spin, which stops it from turning over, and its aerodynamic cross-section (which can - and has - been improved upon, but which is by and large pretty good). I could ask questions all day about frisbees, but I shall restrain myself to one:

In Ultimate Frisbee, a player who is in a tight spot may throw a frisbee over the head of a blocking opponent. The throw is similar to an ordinary frisbee throw, except that the frisbee (and its initial path) lie in a vertical plane when it is thrown. Whe this happens the frisbee invariably flips upside down by the time it reaches the apex of its path and it continues to glide upside down until someone catches it. This, to my knowledge, is the only way to get a frisbee to fly upside down (although I'm sure many players have other ways). I'd like to know why it flips over onto its back. Experience with frisbee throwing tells me that a frisbee is generally much better behaved when it is the right way up. Why, then, should the frisbee decide it likes to be upside down when it is given the choice? Why, for that matter, doesn't it just flip upside down once you throw it in the conventional manner?

As always, write to me via the Physics Society Mailbox, and remember that I'm not just looking for answers, but also new questions. I look forward to hearing from you. And don't forget that Kit-Kat!

J

The KitKat Quotes Competition

As you are about to find out, if you haven't already skipped through this issue, huge numbers of quotes have been submitted since last time. We have been overwhelmed by the amazing response. It appears that several people have formed groups and are competing against one another. The major gangs we can reveal to you are named Quote Collectors Inc., and a consortium that we have called THRB (you know who you are). Even the lecturers are submitting quotes, what is the world coming to? At least people seem to be listening in lectures, even if not for the right reason. We had trouble editing this lot, because so many of the submissions were of printable quality. In the end, we just gave up and printed almost all of them. We have another strong contribution by Dick Collins, but it appears that he has been outperformed by several others. Laurie Peak returns in fine form and Lawrence Cram has made an absolute headlong dash for the quote of the year award by plying his students with quote after quote in rapid fire succession. We also have a large selection from a brand new lecturer in the form of Cathy Foley. In her first lecture course, she has managed to maintain an amazing average of almost two quotes per lecture. Remember, this is a competition. Voting and prize giving will take place at the end of year party (watch for the ads). Quotes will still be accepted right up to the judging, so keep recording and submitting. And now, here goes . . .

Cathy Foley:

"I do have a room here, Room 226B; which I've only found once, so if you can't find it I don't blame you."

"I'm a failed school teacher who hated it so much I decided to do a Ph.D. in physics."

"I'll turn on the switch and run away, because this thing is going to create imitation lightning."

"A poor fellow using an outhouse in the country was wearing synthetic pants. While pulling them off he created a huge charge, which sparked. Now, unfortunately, there was a little methane gas."

"You should be able to do it at home, with your eyes closed, asleep, eating breakfast."

"Mr Gauss must have done this one day while eating his cornflakes."

"The basis of Gauss' Law is that the number of pom-pom hairs is always the same."

Commenting on a student leaving early: "Oh dear, I must have really bad breath."

Commenting on a student leaving early: "I'm just trying to figure out why I brought all these notes in."

"Sort of like how you have to jump through a hoop to get home loans at a bank."

"We're coming to a part of the course now that few people understand. However, if you don't think about it too much, it's really quite easy to understand."

"You can see that physicists aren't always sensible."

"That's one, that's two, that's urghhh!"

"In the interest of science he feasted on onions and garlic and belched all over a compass."

"This class is meant to be full of brilliant minds."

"The force in the **B** field is equal to the Queen Victoria Building times $\cos\theta$."

"I'm hopelessly dyslexic."

"That's a really super-duper blown up version."

". . . derived by experimental experiments."

"I'm used to being in the dark — I work for the C.S.I.R.O."

"This isn't the world's most convincing experiment . . . It's thinking about it."

"Oh. That's not meant to happen yet."

"This place is notorious for the crummy physics demonstrators."

"It basically says the same as the gobbledygook I went through in explaining the minus sign in Faraday's Law."

"That's the same as the current times the distance times something else, I can't remember what."

"I don't know if you saw that movie where the cow was wearing the galoshes."

Bob Shobbrook:

"You've done the course, I haven't."

"Did you all find it very simple, easy and trivial, and did you have little trouble? . . . (silence) . . . I see."

Lawrence Cram:

"As ds goes up, the $d\Omega$-ness goes down in just the right way to make up for the $1/r^2$."
"It is true that . . . what I said is true."
"Oh wait a minute . . . this is right but it's not right."
"This term is, apart from factors of 4π which I don't know about, . . ."
"There are N different possibilities, where N is a very large number."
"There are two different ways to look at this: the obscure, quantum mechanical treatment, or the pseudo-physical argument — which I partly understand."
"Clearly, because I know the answer, $n(H_3^+)$ is equal to $n(e^-)$."
"Well anyway, the outcome of the correct reasoning, when I find the bit that's missing, is . . ."
"I have now got an equation which I am sure I will get wrong."
"Somewhere buried behind this is physics."
". . . then Marconi used electromagnetic radiation to transmit morse across the Atlantic. As an unfortunate consequence, we now have things like *Neighbours*."
"I don't like to be familiar with students."
"Now, we have time to digress even further. I get paid no matter what I talk about."
"There's no sexy quantum mechanics in this."
"I could leave this as an exercise . . . ha, ha, ha!"
Student: "Could you explain . . ." L.C.: "NO! I couldn't!"
"Now, should you fight for your country or should you protect yourself for the sake of science? I mean, what would you rather do; get killed or do science?"
"Pretty straightforward, messy with [spray] paint, but more fun with a machine gun."
"I guess it makes for good after-dinner calculation."
"I suppose you'd have trouble doing a double slit experiment with a Commodore."
"Stop the lecture! I want to get off."
"You don't have the familiarity with Schrödinger's equation, like you do with equations like $E=\frac{1}{2}mc^2$."
Flipping over the overhead: "On the other side of the sheet . . ."
"In real or quantum terms, it's an abstract idealisation."
"If no one tells you this tomorrow, copy it down now."
"You'll pick this up by osmosis."
". . . and these have beautiful spectral lines and . . . hmmm . . . you're not interested, are you?"
"What would you prefer to do: read the *Feynman Lectures* or play *Leisure Suit Larry 2* ?"
"It's got 640 kilohertz of memory."
"It's not deceptively simple, it is simple."
"One of the Holy Grails of astrophysics is to see a star being formed but, like humans, they do it in the dark."
"We don't understand the late stages of stellar evolution . . . we don't understand the early stages either."
Student: "Shouldn't it be R^3?" L.C.: "Oh, I don't care whether it's R^2 or R^3."
"Come to my first year tute, it's a good laugh."
"This bulge thing in the centre is called the central bulge."

Dick Hunstead:

"My grasp of the theoretical side of this is as weak as some of yours."
"I'm not going to make many handouts because I'd rather you have the joy of battling with the photocopier."
"The redshift measures only one thing — the redshift."
"The real Universe includes you and me. Well, you might regard me as just a statistical fluctuation, but we can't all be those."
"This constant has varied from about 500 to about 50 in the past fifty years."

Ian Johnston:

"I don't want to spend more than fifteen minutes apologising for the Schrödinger Wave Equation."
"You all have AIDS; Acquired Intelligence Deficiency Syndrome."
"Solving differential equations is best done by monkeys in front of typewriters."
"There is the contagious disease of mathematics that spreads out from the realms of Carslaw, contaminating all within it's grasp."

Ian Falconer:
"Now if we take a Laplace transform . . . (writes) . . . I think this is how you do it."
"Where's the E_o? I think I probably ignored it on the way through."
"HW stands for half width, not half wit."
"We are now where we should have been half an hour ago."
"We'll do this a couple of minutes in the future."
"Do you all believe in the Maxwell-Boltzmann distribution?"
"Helium-neon lasers contain helium and neon . . . but I don't know why they're called helium-neon."
"I am now going to use γ to mean α." Student: "But you've already defined γ." I.F.: "You're smart enough to distinguish them."
"You need a longish τ, but not too long."
"The problem is not intractable, it's just tediously difficult."
"This graph is obtained by a trivial differentiation of P_o, but I'm damned if I can do it."
"Now you can write the ratio as this, but it doesn't help us much."
"Laser lectures are, by definition, coherent."
"This is a consequence of all the modes beating . . . but so bloody what?"
Student: "Where are our notes?" I.F.: "I made the mistake of trying to use a word processor, you'll get the notes sometime before I retire."
"Anyone with some spare time and masochistic tendencies can read about spectroscopy."
"A helium-neon laser is just a glass tube with a couple of bizzos on the end."
"I have discovered a new text processing system — pen and paper."
"I built one of the first argon lasers in the world. It was very expensive; it lased, then it melted."
"We all understand rare gases. They don't form molecules, do they . . . (thinks) . . . well, actually, they do."

Dick Collins:
"There's a hell of a lot of kudos resting on this quote competition."
"At least someone out there is collecting my quotes, even if they handed them in a little late."
"We're not talking about ordinary gumtrees . . . they're oscillating."
"Imagine you're an electron . . ."
"No one makes capacitors like this because you'd need a wheelbarrow to transport a radio."
"Let's approximate it as a sphere and then watch me talk my way out of it."
"Now I know that some of you don't like my handwriting . . . I don't like it either."
"We remove a cavity."
"It's not wrong, it's just algebra."
"Are you implying that I collect my quotes and re-use them from year to year?"
"That was not a prepared quote."
"He was an engineer, which means he had no credibility whatsoever and no morals."

Bill Tango:
"Anyone caught reading *Jeremy* during this lecture will be chained to the Fabry-Perot experiment in the second year lab."
"Instead of using a simple-minded first year approach, we will use a simple-minded second year approach."
"One of these things costs a hundred thousand bucks, but that's irrelevant."

Elaine Sadler:
"While you're going home on the bus or train, you can practice pulling your rubber band."

Ross McPhedran:
"We can't predict the future, but we can predict the past."
Quoting Einstein: "The more success the quantum theory has, the sillier it looks."
"We are not going to be able to do much with this integral."
". . . it's related to the Riemann zeta function, for those of you who are connoisseurs of special functions."
"This is not elementary, you can't do it, so you give it a name — the Debye function — and you look up the answer in a book."

Laurie Peak:

"Half an MeV is 511 keV . . . approximately."
"Good morning. Let's get off on another fun-packed lecture."
"Well, you might say what's a factor of 10^{13}? But it's actually an enormous difference."
"If you take a year to do this course, that's okay. But if you take 10^{13} years, things might get a little tedious."
"Everyone knows from school that one plus one equals zero, one or two."
"The CPT theorem says that we can have an anti-me lecturing to an anti-you, standing on my head, writing with my left hand and lecturing backwards. Then there would be no fundamental difference to us here now."
"This is my own wording that I'm making up as I go along, but it'll be about right."
"In the centre of mass frame, the particle sees itself as the centre of the Universe. Everyone sees themself as the centre of the Universe, we all know that."
"It's actually amazing that the physics in fourth year is the same as the physics in third year."
"This is an enormously tiny difference."
"You know this because I told you and you believe everything that I tell you."
"We make a bold assumption and throw in a couple of coefficients to cover up our ignorance."
"This is a three kilometre dragstrip for electrons."
"We could make a coke bottle or an anti-coke bottle."
"We stimulate your emission . . . I've got lasers on the brain."
". . . and there's a standard Geneva Convention person, kept at S.T.P."
"I've got oodles and oodles to tell you."
"Decay always takes place from l=0. 'Always' as in 'nearly always'."
"t equals 2×10^{-10} seconds . . . (calculates t) . . . and we get t equals 6.3×10^{-10} seconds. Oh. Well, let's just say t is of the order of 10^{-10} seconds."
"Meanwhile, back in the real world . . ."
"The beauty of an accelerator is that you can turn it on and off."
Quoting a reference: "Darby, et al. . . . I don't know Al is, but he writes a lot of papers."

Rod Cross:

"If I have a look at the syllabus here, I'll find out what I'm supposed to be teaching you."
"Will these photons escape the plasma? Well, some of them do and some of them don't. If most of them don't escape, then not many will."
"What I'm going to do is get the answer and then multiply it by 30 so that I get the correct answer."
"It was realised after the First World War that you could use this technique to create a nuclear bomb. That was eminently successful."
"If you look at a chimney — that's a big thing that sticks up in the air — . . ."
"Let's do a back of the envelope calculation first. In other words, a guess."
"I can integrate that . . . ummm . . . I think . . . yeah, I can integrate that."
"And after all of that algebra, we have that the force equals the mass times the acceleration!"
"If you find any of this stuff exciting, then you must be a theoretician."
"We get Ohm's law:

$$\frac{m_e}{n_e e^2}\frac{\partial \mathbf{J}}{\partial t} = \mathbf{E} + \mathbf{v}\times\mathbf{B} - \frac{1}{n_e e}\mathbf{J}\times\mathbf{B} + \frac{1}{n_e e}\nabla P_e - \rho\mathbf{J}\ ."$$

"This is generalised in the sense that it's general."
"Well, let's suppose . . . no, we won't suppose anything."
"This is just a bit of general waffle."
"The theoreticians love plasma instabilities because there are so many of them, it's so mathematical, and you can't check it by experiment."
"The phase velocity is greater than the speed of light. Being in third year, that shouldn't bother you much. It doesn't bother me at all."

Kevin Moore:

"Hey! We're fudging here."
"Who's the bastard who submitted my quotes!?"
"Chemistry is merely a corollary of the Schrödinger equation, as a friend of mine once said."
"Momentum is conserved. It's always conserved, that's what makes it so annoying."

Dave Crawford:
"This is a lovely little tensor. It's used for screwing things up."
"Now I'm not going to explicitly throw this variable out. I'll implicitly throw it out."
"I'm probably inconsistent, but don't worry about that."
"We just replace θ by $i\Psi$ to make it all nice and imaginary."
"In this era of $t<10^{-43}$s, the Heisenberg Uncertainty Principle dominates and so the Universe is just one big uncertainty."
"This is different by a factor of 2, but what's a factor of 2 in astronomy?"
"I don't want you to write more than several pages for this assignment."
"Weinberg [textbook] is wrong on this point. Or maybe he's right and I'm just being stupid."
"Black holes are just like black bodies."
"I don't want to go into all the details of this because I'll probably get it all wrong."

Paul Walker:
"I can spend an hour telling you what I'm going to be talking about for the next hour."
"This feeds in to enthusiasm and turned-onned-ness . . . that was a good word, wasn't it?"
"I sincerely urge you not to believe anything I have to say."

Brian McInnes:
"Actually, there are other things in the world besides physics, as you well know and some of the staff well know."
"Nobody's going to put swings in council parks that are overdamped. The kids would object."
"At about fifty kilometres is the region where the ozone is, or should be."
"When you turn the sun off . . ."
"Students aren't allowed to do things together."

Brian James:
"On the handout you can see . . . oh! oh! there's a mistake! — and I was so proud of it too."
"The algebra will get a bit messy and at some stage I'm going to bail out."

Carlo Rubbia (Director-General of CERN, Nobel Laureate in Physics):
"I apologise for the complexity of my presentation, but I am not responsible for how the world is constructed."

Steve Wall (Jet Propulsion Laboratory):
"Not only is [Voyager 2] getting faster, but it's getting faster faster."

FØREIGN QUOTƎS:

Mark Sceats (Physical Chemistry):
"You make an approximation which then contradicts your assumption. But that's okay, that's physical chemistry."
"The result is absurd but highly useful."
"Here you have to get used to the turkey language devised by the biochemists."
"Just think . . . NO! DON'T!"

Leslie Field (Organic Chemistry):
"If you were an electrophilic hydrogen, you'd want to chew on the electron-rich pairs of this molecule."

D. Ridley (Organic Chemistry):
"Now I know this makes it extremely complicated, but it's quite simple really."
"What we've done is we've convinced ourselves . . . well, at least I've convinced myself . . ."
"Don't quote me on that!"
"This is a highly examinable process."
"Now, I know you're going to ask 'Are you going to examine us on this crap?' "
". . . in other words, if you're going to roll around in buffalo grass, do so with clothes on."

Peter Lay (Inorganic Chemistry):
"Non-metal oxides are basically acidic."

W. Taylor (Organic Chemistry):
"Hi! I'm Professor Taylor, not Dr Ridley with a new haircut . . . He told me to make that joke."

Nigel O'Brien (Pure Maths):
"We're having a little game where everyone who turns up more than five minutes late has to leave again." Student: "I'm not playing."
"Oh my god! What does this mean?"

Gordon Monro (Pure Maths):
"Perhaps we should request that people go die **outside** the room."
"The biggest problem with these functions is how to pronounce them."
"It's no use copying your assignment answers off the person next to you, they're probably just as wrong as you are."
"One of the worst things about this course is trying to prove the obvious and not being able to do it."
"The mathematician writes *a*, says *b*, means *c* and it should be *d*."
"Imagine that the ε is the space invader and the δ is your joystick."
"I have no control over my ε."
"I'll ask you to be bored in silence."
"What I want you to do now is go back to sleep."
"This has taken so long that we've forgotten what the problem was."

Roger Eyland (Pure Mathematics):
"These are things that you were supposed to know in a previous incarnation."
"Perhaps we'll draw a graph. That'll be a bit of light relief, won't it?"

Bob Crossman (Applied Maths):
"And what do you get if you add equations one and two? Well, possibly brain damage, but . . ."

C. Cosgrove (Applied Maths):
"You can't even expect an applied amthematician to figure that out."

Michael Wise (Computer Science):
" 'Bulletproofing' is trying to get your programs to die more quickly and then tell you why."
"In some lectures, people have looked at me, gone 'Blech!' and died."
"We want to be able to create students out of nothing."
"Always use a diagram when playing with yourself."
"Don't take my word for it, do it yourself. Irrespective of what kind of lecturer I am."
"It's not wrong, I'm just showing off."

David Feng (Computer Science):
"I warn you . . . you talk once more, I ask you out!"
"If you find this complicated, then something wrong with you . . . ha, ha, ha!"

Judy Kay (Computer Science):
"The tutors are there for you to help."

Ron Farran (Law):
"The Constitution was part of our toilet training."

R. Soames (Psychology):
"Apparent conditioning is obviously the best method to use because, with apparent conditioning, I can go to Manning and get pissed while my experiment runs."

J

So Long, and Thanks For All The Physics

A Tragedy in Four Acts

by David Mar and Kim Lester.

Don't Panic.

We think that just about sums it all up.

Anyway; our intrepid explorers have been separated into two groups and subjected to various indignities and mysteries as they desperately search for a way out of the Physics Building. Ford and Trillian have just escaped from the dangers of the Applied Department and Zaphod and Arthur have run in to the numinous figure of someone called Ian Johnston.

Act Four

Before Zaphod could recover enough to say anything, the beaming figure spoke.

"Hello, who are you? No, wait, let me try to intuit the answer. By noting that you . . ." he pointed to Zaphod, ". . . have two heads and that you . . ." to Arthur, ". . . are wearing a dressing gown, it's clear that, by taking a Fourier Transform of your spatial body part distribution function and realising that, of course as everyone knows, the wearing of time specific apparel is logarithmic with respect to an absolute coordinate space, I can easily come to the obvious conclusion that your names are Zaphod Beeblebrox and Arthur Dent and that you're looking for a way out of this building."

Zaphod and Arthur goggled at this strange man, too stunned to be capable of even expressing their amazement at his seemingly miraculous deductions. Sensing their mystification, Ian Johnston continued.

"Of course you could prove it all mathematically if you wanted to, but it's just a whole lot of messy algebra."

At this point, Ford and Trillian appeared as they came down the nearby stairs from the Applied Physics Department.

"There they are," said Trillian, pointing out the trio below.

"Hi guys," said Ford, nonchalantly sauntering off the last step, "What's going on?"

"Oh, hi Ford," replied Arthur, "We've just run into this amazing guy here. He seems to know everything, so maybe he'll be able to tell us the way out of here."

"Ah, yes," began Ian Johnston, "a way out of the Physics Building. Well, unfortunately that's not such an easy thing to accomplish. The Theoretical Department have been working on it for years. You'd be better off just trying to make the best of things as they are."

"But," chimed in Trillian, "we're trapped here in this place, and it's a physics department! We can't spend the rest of our lives here! It's not exciting enough, there's no social life, there's no . . ."

"Booze," finished Zaphod, who had finally recovered his senses, including that of priority.

"Hmmm . . ." said Ian Johnston, "You could always try the Physics Society party up on the roof. It's just started. There should be plenty of food left. I also heard that some students were planning an escape tonight. They'll probably be up there and might be able to help you. Would you like me to sing for you?" he finished, beaming.

The Hitch Hikers Guide to The Physics Building *says a few words about beaming physicists.*

Amongst the usual crop of boring, everyday physicists, there sometimes appears one who is not at all like the others. He or she will usually be found stalking the corridors of the building in which they live, looking for unwary students to bamboozle with their infinite knowledge and wisdom. Unlike normal physicists, the beaming physicist delights in lecturing to students, and tends to do so even when merely talking socially. Once in a lecture, the beaming physicist is discernable from an ordinary physicist by his or her attitude to student ignorance. Where a normal physicist would say, "What? You've never seen Bose-Einstein statistics before? What have they been teaching you in first and second year?" the beaming physicist says, "Of course this is just Bose-Einstein

statistics, as you recognise from kindergarten. You all know everything there is to know about that so I won't go into it."

Finally; never, under any circumstances, allow a beaming physicist to sing to you.

The group wisely declined Ian Johnston's offer and quickly headed up the stairs again. The way was laid out for them with large posters with arrows on them, which had mysteriously sprung up from nowhere since they had last looked around. "This way to the Solar Roof and the Physoc Barbecue," the signs proclaimed. "All the beer you can drink," caught Zaphod's eye as they rounded a corner to be confronted with a small, dark and dingy stairwell that looked as though it might collapse if anyone decided to try and use it. They hesitated for a second before the sounds of the party above reached their ears. Throwing their fates to the wind, they scrambled up the stairs in an all out effort to reach this place that at least sounded like it was full of normal activity.

Physics Society parties are notorious for their ability to distract otherwise sane people from their imminently due assignments, reports, essays, theses, last minute lecture writing, grant application forms, &c. and induces them to doing something which they actually enjoy and not something which they have to do. They also distract insane people equally as effectively. The best Physics parties in the known Universe are held in some obscure part of the Sydney University Physics Building. Since they were once rarely advertised, only the hard core physicists actually knew about them, and even less could be bribed away from their books and computer terminals with the prospect of cheap food and drink.

A traditional part of all parties is the creation of a particularly lethal and vile substance, which is then used in obscure rituals involving the imbibing of said substance, termed Poisonous Undergraduate Noxious Concoction: Health-hazard. It was thought that the reason for such a ritual was to get the party goers so drunk that they would not notice the extremely high carbon content of some of the food. This theory was later abandoned in favour of the idea that Physicists like to get just as drunk as everyone else, once in a while anyway. Another thing which is always present is a box of highly complex and intricately shaped brown lumps of surprisingly edible matter called Nutri Grain.

Theoreticians have tried in vain for years to model Physics parties. Calculations of such parameters as the number of party goers, the amount of food and the admission price have never been successful. Experimentalists have shown that most of the behaviour of a party is chaotic. All prospective models of Physics parties must explain the presence of the packet of Nutri Grain.

The group managed to reach the top of the stairs and weave their way through a maze of stacked glass tubing only to be stopped just short of the party proper by a pair of students who were waving receipt books threateningly.

"Are you a member?" asked one.

"Have you paid?" demanded the other.

"$2 for members and $4 for other species," continued the first.

"Actually," began Ford," we're lost. We just want to find a way out of here."

"First years, are you?" concluded the second student.

Before Ford could reply, the first student turned around and yelled, "HEY EVERYBODY, WE GOT SOME FIRST YEARS HERE!" He turned back to the group and ushered them out on to the roof.

"Where's the beer?" asked Zaphod.

"Oh, an engineer, huh?" said one of the students. He looked at Zaphod's two heads and three arms. "You'll have to pay double."

The group paid up and wandered out to see what was going on. A crowd of students were busy peering into a huge, bubbling container, daring each other to have a drink from it. Zaphod grabbed a plastic cup from the nearby table and plunged it in to the murky depths of the bowl. Lifting it out, he found that half the cup had dissolved.

"Man! That's some punch!"

Ford, Arthur and Trillian had started up a conversation with another bunch of students.

"So you're first years, huh?" one of them said.

The three nodded, realising that explaining would probably take more time than it was worth.

"Just wait until next year," the guy continued, "it'll be hell. I've just escaped from the Second Year lab, where I was being tortured on a Fabry-Perot interferometer."

"You think that's bad?" interjected a girl, "I've just been released from the Third Year lab. They had me on a thing called an interference spectrometer."

At this point a cold and clammy hand grabbed Trillian around the ankle, causing her to gasp with horror. A gaunt and haggard body lay on the floor, it's skin pale and with the outlines of bones showing. The emaciated face looked up and stared at Trillian with sunken and bloodshot eyes.

"My god! What's happened to you?"

The figure moaned, "I'm a fourth year student."

Before anyone could say anything else, two other students rushed over to help the person to his feet and escort him over to the barbecue, where they gave him several sausage sandwiches and a cup of orange juice. "Just eat and drink up," they said gently, "Then you can have some sleep. Nobody can get you up here. It's all right."

The figure refused to sit down. He rambled on, "No! There are others! I was lucky. I made it this far. Some are still down in their departments. We have to . . ."

"No," said one of the others, "we'll go after them. You stay here and rest."

With that, the two benefactors disappeared back inside the building and downstairs.

Zaphod returned with two beers and a handful of small, brown shapes, from which he occasionally threw a few into one of his mouths. Arthur and Trillian decided to go over and try to get some sausages. Another couple of students approached Ford and Zaphod.

"Hi," said Ford, "Do you do physics too?"

"No," answered one, "we're college students. We just heard there was something going on over here and came with some other gatecrashers."

The more enlightened civilisations have banned the existence of the life form known as the college student, having discovered that their presence in universities has little or no correlation with academic pursuits. These nocturnal creatures tend to emerge from their lairs at the last possible minute before their first lecture, having first donned the three least filthy pieces of apparel within their grasp, and often crawl to lectures wearing dark glasses, especially on Mondays. It is a well known fact that college students do not sleep, but merely pass out for a few hours.

Waiting in the queue, Arthur and Trillian noticed that the people at the barbecue were stuffing sausages and salad in to their pockets, oblivious to the cries of the others behind them. Arthur asked the student in front of him, "What are they taking so much food for?"

"Either they're masochists, or they're the ones planning the escape tonight," replied the student.

Grabbing Arthur's arm, Trillian yelled, "Ford, Zaphod! We've found the students who are going to escape. Over here." She dragged Arthur towards the barbecue.

One of Zaphod's heads worked its way up from the punch bowl and his eyes tracked across towards Trillian. Ford, who was not nearly half as drunk as Zaphod, managed to guide both him and himself (If you think this makes no sense then you're probably drunk yourself — Ed.) over to where Trillian was questioning the students.

"So what's the escape plan?"

"Well," answered one of students, "We're just waiting for a passing space ship. We've built a Sub-Etha Sensomatic in our labs. That's sort of like an electronic thumb for hitching lifts off space ships . . ."

"Yeah, we know," interrupted Ford.

"What?" said the student, incredulous, "They're teaching this stuff in first year now? Anyway," she continued, "we've put it in to a theory-proof box so that the Theoretical Department can't wreck it, and now we're just waiting for the ship to pass by."

"You actually know that a ship is going to be passing by tonight?" asked Arthur.

"Oh yes, we've been tracking it with the third year radiotelescope experiment for weeks now. It's pretty tough too. You have to keep adjusting the positions by moving the antennae with car jacks."

"Would you consider taking us with you?" asked Trillian.

"Well, we do have enough power for four more people," the student stated, "We were considering taking the winners of the Quotes Competition with us, but I can see that you guys," she looked at Zaphod, "are probably in more need to get out of here than they are. I mean, anyone who actually goes to the lectures and listens to what the lecturers say probably enjoys it here anyway."

"Great! Thanks!" effused Ford, "Hey Zaphod, did you here that? We've got a way out of here!"

Zaphod focussed carefully on Ford. "Rats. I was just beginning to have some fun."

"Hey!" interrupted another student, "We're getting the signal loud and clear now. Get ready to hitch! Has everybody got their towels?"

"Drink some beer," ordered Ford, "and grab some peanuts!"

"What?" asked the student.

"Trust me," answered Ford, "I've done this before."

All of the students, including those not intending to leave so soon, had another beer. The girl in charge of the escape grabbed a bag of peanuts from the clutches of Ian Johnston, who had just arrived.

The other student yelled out, "Okay everyone, here we go! I'm signalling now!"

There was a flurry of excitement as the rest of the students looked up to see a beam of green light shoot from the sky and surround the group (Corny, ain't it — Ed.).

Arthur felt his body begin to tingle, in an unpleasantly familiar way. He would never get used to this form of travel. Ford planned his travel itinerary for the next six months. Trillian looked with infinite pity upon the students that were being left behind. Zaphod was too busy feeling sorry for himself to feel sorry for anyone else.

Arthur could see Ian Johnston beaming at them as they slowly faded out of view.

"So long," he yelled, ". . . er . . . and thanks for all the physics."

The Guide *has this to say about hitching lifts . . .*

The End (For us, anyway).

Addendum: These facts were compiled at 0400 hours on the day before this issue of *Jeremy* went to press. So any slight factual errors are not covered by the Intergalactic Trades Description Act. We also feel obliged to apologise for any lowering of literary standard that may have been caused by our weariness. The Eds.

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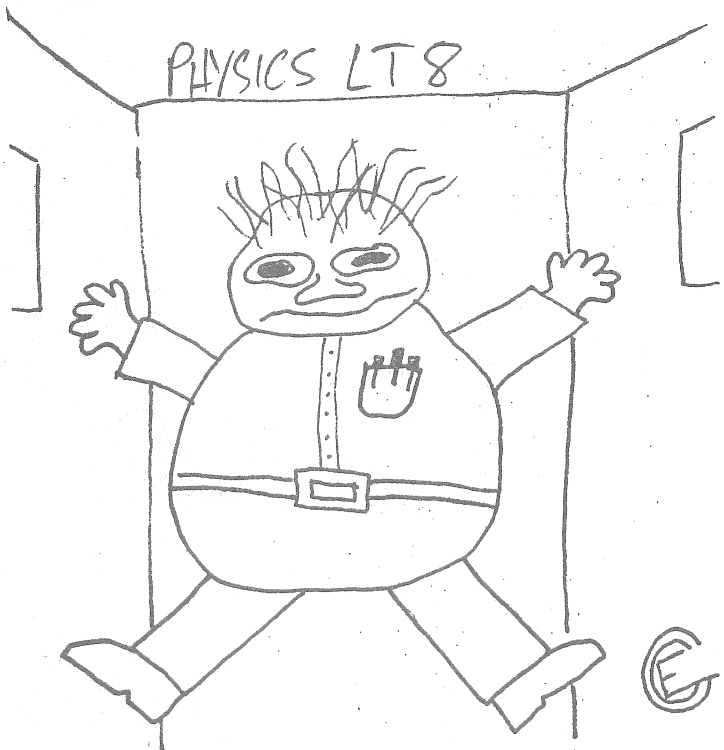

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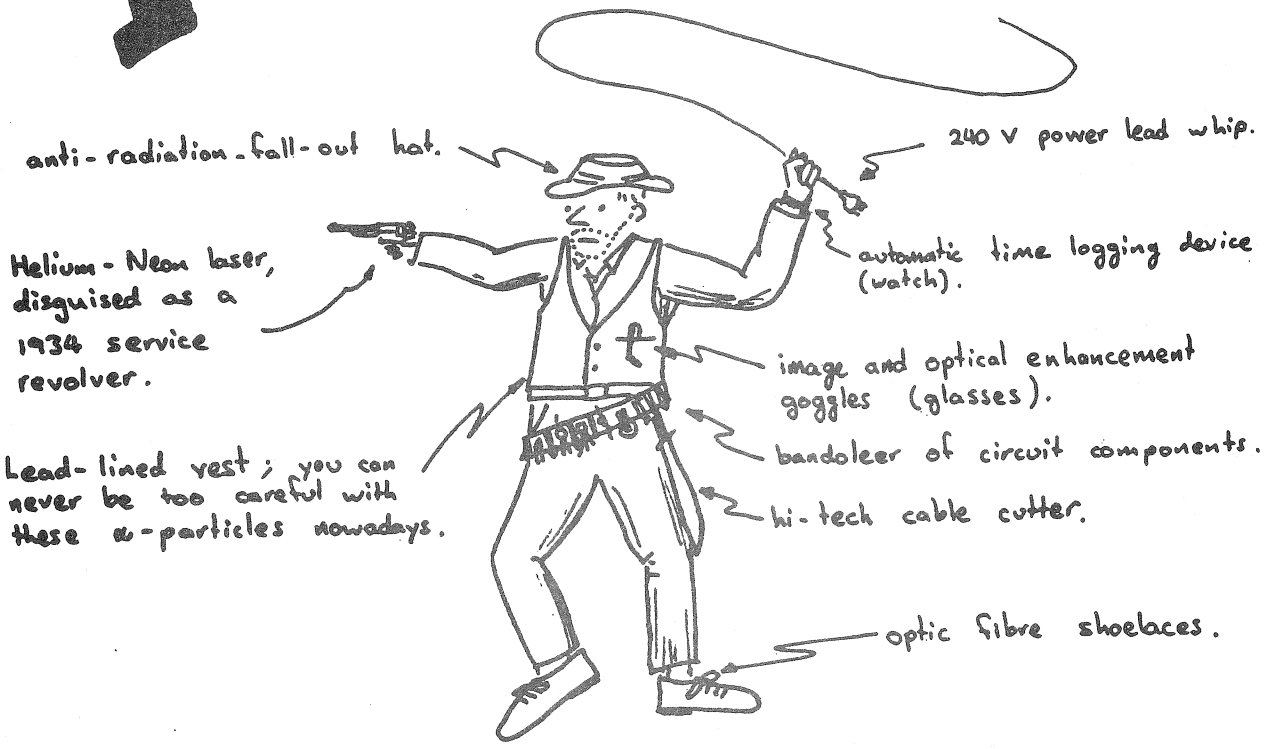

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