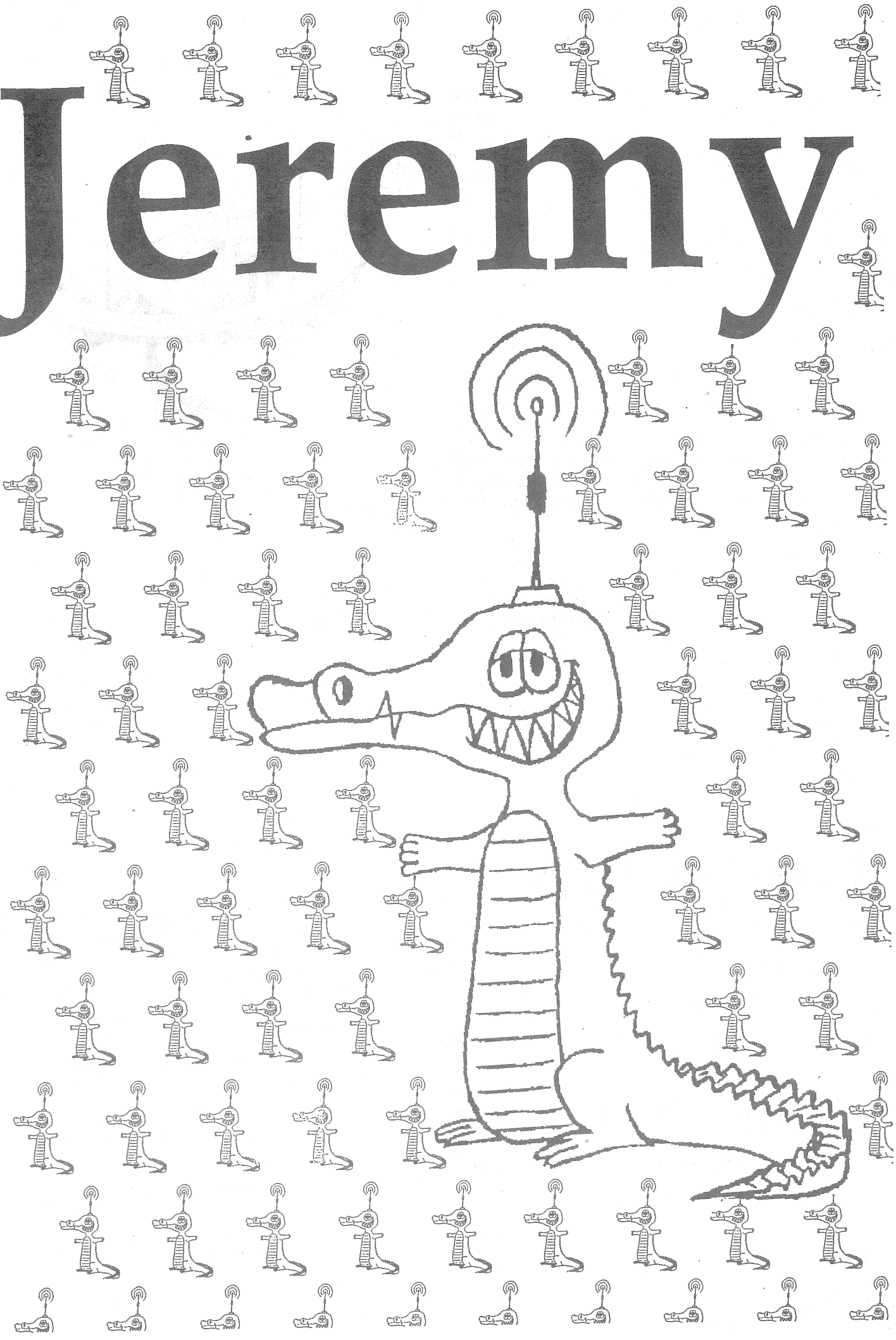
Jeremy

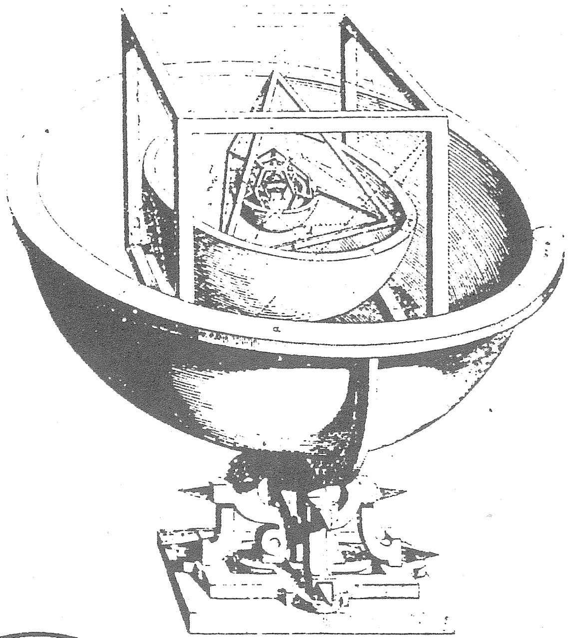


Editorial

Hello again and welcome to this slightly delayed issue of your favorite journal. We here at *Jeremy* hope you all did well at exams, and had a great holiday. No doubt many of you are wondering where we have been, and we would love to tell you but that information is a state secret.

For those of you who read all the Journal, and not just the Quotes, there is a lot for you this time. There are articles by Ian Johnston and Professor Cram. Along with a variety of other articles. Physics Forum is back. with new questions, so keep your answers coming in, as well as any questions you might have.

In the various lecture theaters around the place, there have been placed mail boxes for articles for Jeremy, as well as the main physoc postbox. So there is no excuse now for not submitting any quotes or ideas you might have about the physics society. In particular the supply of quotes is drying up, and if it were not for a bunch of dedicated 3rd and 4th year students, there would hardly be a Kit Kat Quote Competition. Surely the first and second year lecturers must say something in their lectures. Any first of second year student who submits a quote will receive a handful of Kit Kats !!!! so get hopping.



Editors.
Damien Hogan
Niel Brodrick

Contents

Disclaimer

Jeremy is not published under the auspices of anyone the editors are aware of. All expressions of opinion are published on the basis that they are not regarded as the expressions of the Sydney University Physics Society unless expressly stated.

The Society accepts no responsibility for the accuracy of any of the opinions or information contained within this publication, nor does it necessarily endorse any advertisements herein. Nor should it be infered that any of the information in this Journal is correct or true, or that any statements contained herein have any value whatsoever. And don't think we havn't lied all the way through, because we have . Again and again. Pages 3 to 12 contain no justifable statements and are entirely a figment of my drug induced hallucinations. I made them up just to piss you off. [illegible]

Furthermore, all expressions of opinion are published on the basis that they not necessarily to be regarded as expressions of the editors unless expressly stated.

The Editors.

Letters

Intro required

Sir:

Do you hate Jeremy? Does it represent everything you hate about student publications? Is the back of your cereal box a great deal more interesting ?

Here's your chance to improve it. Contribute! According to Union publication rules student editors must complain at least once per issue about the lack of student submissions. So here it is.

Jeremy will publish your letters on anything vaguely science related.

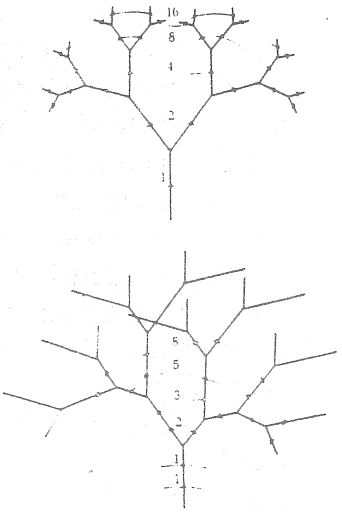
Vent your spleen on Ross Free or write a poem or pose a question or just abuse us. No reasonable offer refused.

A.Faeke
Physics 2.

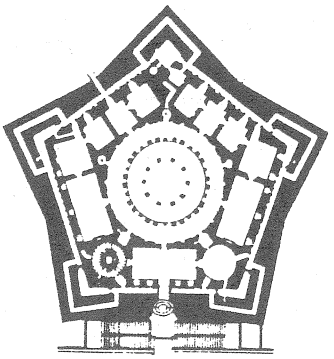
Pithy comment

Sir:

Preference will be given to letters under 200 words in length, written by media moguls or accompanied by cash inducements (not necessarily in that order).



The two major branching patterns, one demonstrating the geometric progression by 2 (, 2), and the other the Fibonacci Series (ϕ).



If you would like to contribute, but a full article seems a little out of your depth Never fear! There are plenty of smaller projects that you could work on. As an example Jeremy is in need of a staff astrologer, astronomer, artist and also someone to write a puzzle column similar to math./computer recreations (Sci. American). Just think of the fame, the guts, the glory, your c.v. Don't miss out.

M.Plank
Physics ∞.

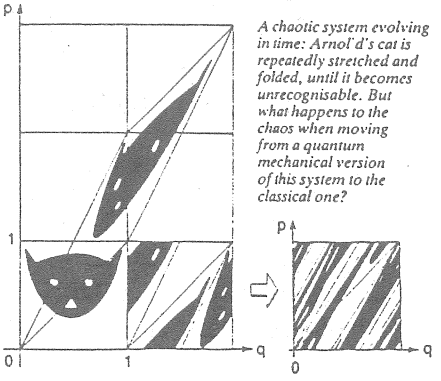
Twisted Tom

The validity of quantum mechanics as the fundamental theory of nature has been challenged. Quantum theory, which underpins much of modern physics, is known to suppress chaotic behavior. Now Joseph Ford, Giorgio Mantica and Gerald Ristow of the Georgia Institute of Technology say that this represents a failure of quantum mechanics, and that the standard theory may need to be revised.

Over the past 20 years or so, people have discovered chaos in many sciences as well as in everyday phenomena such as the weather. The systems in which chaos has been found are all large-scale or "macroscopic" processes that are ruled by the laws of classical physics. But in the mid-eighties, classical chaos- defined as extreme sensitivity to initial conditions- was found to be absent in the microscopic world of atoms and molecules that is ruled by quantum mechanics.

What connects the quantum and classical worlds is the correspondence principle. Simply put, this says that as a system becomes larger it becomes more classical.

Ford and his colleagues argue that when there is chaos, the correspondence principle fails: that is, it connects quantum mechanics not to all of classical physics, but only to the remnants of order in it. These remnants are the the set of possible trajectories of a



A chaotic system evolving in time: Arnol'd's cat is repeatedly stretched and folded, until it becomes unrecognisable. But what happens to the chaos when moving from a quantum mechanical version of this system to the classical one?

physical system which remain periodic, among an infinitely larger number of chaotic ones.

They back this argument by their handling of a problem in chaos theory called Arnol'd's cat. Like its better known relative Schrodinger's cat, Arnol'd's cat meets an unfortunate fate: as the chaotic system evolves in time, the cat's image is repeatedly stretched and folded until it becomes unrecognizable.

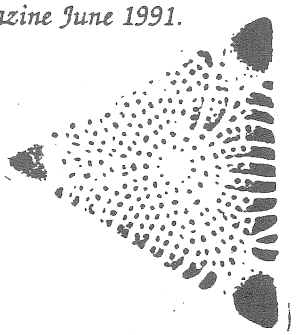
Several years ago, physicists discovered that it is possible to produce a quantum mechanical version of Arnol'd's cat which does not exhibit chaos. Starting from such a quantum mechanical cat, Ford and his colleagues tried to recover the classical chaos from it, by applying their version of the correspondence principle. But they could not regain the chaos, only the ordered periodic trajectories.

With this result, Ford and his collaborators have challenged the widely held belief that quantum theory "contains" all of classical physics, and that classical physics is simply an approximation that works well at the macroscopic level.

So what happens to the chaos, which we see around us but is forbidden by quantum theory? The general consensus is that quantum theory does allow some room for chaos- for a while. Until the "break time", a quantum system will mimic its chaotic classical counterpart.

To determine conclusively whether any system is chaotic, it must be observed for a very long time. And to recover chaos from a Quantum system, the correspondence principle must be applied; in other words, the system must be enlarged. The ordering of these two steps is important: the system must be enlarged first. But according to some, the technique used by Ford and his colleagues may introduce some ambiguity in the ordering of these two procedures- a criticism Ford strongly disputes.

by Tania Monteiro of New Scientist Magazine June 1991.



Prize Focus Lost

by A. Bliss

The Australia Prize appears to be down for the count only one year after its inaugural presentation.

The tax-free prize valued at A$250,000, was introduced by Barry Jones and was intended to recognize "outstanding achievement in science and technology promoting human welfare."

The first prize was presented to professors Kerr, Schell and Nester for their work on the genetic engineering of virus resistant plants and microbes. These strains are among the few engineered organisms with permission for commercial release.

Unfortunately the award achieved little media impact, Jones was dumped, "FLOP" was muttered aloud by all concerned and the prize has not been heard of since.

A spokesman for (now also ex) science minister Simon Crean recently told me that the prize was under review and that a committee was looking at a number of different options including having two separate prizes awarded biannually one national the other international.

Mr. Jones was highly critical of this concept describing it as a"science tariff" and as a move which would make the award completely disreputable."

In a recent letter to New Scientist Barry Jones stated that "the purpose of the Prize was not primarily...to raise the profile of Australian science in the community. It was always intended to be an international award."

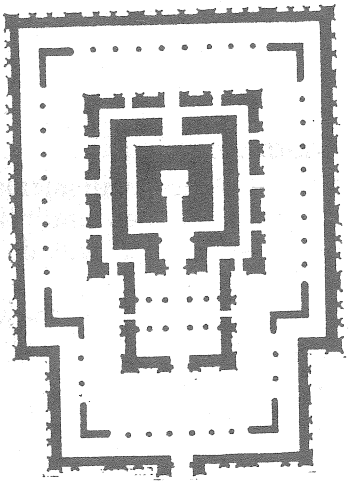
However many believe that the prize should have a much stronger national focus. Mr. Creans office said that Australia already had a good international reputation and that the Prize should focus on fostering links between Australian science and Australian industry.

Unhappily for Barry Jones the Prize will almost certainly become more parochial. Despite the first award Mr. Jones never really won a philosophical commitment to an international prize. The Hawke governments interest in the Prize only extending as far as it might help domestic problems.

Of course Barry Jones is not the only loser in this affair. With well in excess of $400,000 already spent on both the prize and administration one might expect that the goals of the award would now be well defined, indeed some radicals might argue that the purpose

should have preceeded the presentation.

If the Prize were just a single incedent of incoherent science policy, in an otherwise sound platform, it would be merely annoying. However the Prize is symptom of a much more serious problem. Aberrations such as the Australia Prize with continue whilst the future of science in Australia remains unclear.



Quantum Chromomechanics

Professor Greg Hindwood of The International Devine Institute for Crystal Healing and Physical Love has recently blessed Jeremy with an earth shattering new theory. Prof. Hindwood is currently posing as a first year physics student at Sydney University but took time out from his busy schedule to explain some of the implications of the rapidly growing field of quantum chromomechanics. The success of both quantum chromomechanical theory and Prof. Hindwood will no doubt become immeasurable.

$E = mc^2$ $\quad\quad$ $\upsilon\lambda = c$

$c^2 = E/m$ $\quad\quad$ $\upsilon = c/\lambda$

$c = \sqrt{(E/m)}$

$\therefore \upsilon = 1/\lambda \,.\, \sqrt{(E/m)}$ or $\upsilon \propto 1/\sqrt{m}$

Using the Parc-Latot relationship :

$W = mg$ so $g = 1/m$ thus $g \propto \upsilon^2$

=> Acceleration is a property of color.

Practical Applications

Prof. Hindwood cites some of the more common applications of his theory to previously inexplicable properties:

❑ Working in conjunction with the Italians Prof. Hindwood revolutionized the design of formula one cars by use of specially prepared red paints. Prof. Hindwood points to the success of the Ferrari team in formula one racing as proof of the value of his work, his opponents have been known to do likewise.

❑ The bumble bee at the other end of the spectrum is known for its high weight to wing size ratio and its awkward flight. This effect becomes transparent when the degree of purple pigment is considered in the light of Prof. Hindwoods important work.

Contributions to the dud theory contest will be judged and the most scientifically offensive theory awarded an as yet undefined prize (most probably Kit-Kats).

In Brief

❑ Jeremy has received numerous reports of sightings of everybody's favorite genius Albert Einstein. According to the most recent report he is presently a checkout-chick at Franklins at Newtown. However when we went to speak to him both he and Elvis had left the building.

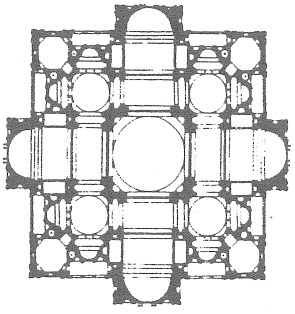
❑ In other news this week, there is a soccer match between Physics and Chemistry coming up, so be there to support your favorite school.

❑ Also on the agenda is next Physoc party which is to be held in a couple of weeks. There will be lots of alcohol, juice, munchies and perhaps sausages.

❑ On the talk front there have been a number of good talks, with lots more on the way. The lengths people will go to, to avoid giving a talk is unbelievable, with one member of staff flying to South America in order to get out of giving a talk.

❑ It was open day at Lucus Heights last week on Thursday and Friday. If you missed it and are still interested in seeing inside the facility then give ANSTO a ring and they will book you in to one of their regular (free) tours.

❑ P.S. If your idea of good time does not involve eating grissle filled condoms then write to the Society and ask them to cater to some different tastes.



My life as a Physicist

by L.E.Cram

From time to time, when one of my classes has obviously reached "saturation level" (evidenced by more than 50% of students asleep/daydreaming/cuddling), I devote a lecture to talking about careers in Physics. A few of the class (always male, often Engineers) leave, but most students seem to be more interested than normal. Consequently, it seemed a good idea to accept the Editor's invitation to write about the topic for Jeremy.

There are three important matters to consider when discussing employment of Physicists. The first concerns general issues related to work and employment; the second concerns the statistics of the current job market including destinations and salaries; and the third concerns prospects for the future since most student readers of Jeremy will not be seeking a job before about 1995, and will not be entering the full-time workforce until about 1998.

Work and employment

In our culture almost everyone wants to work, not only to earn a living wage but also to feel that they are a worthy member of society. This second point is crucial: while income is always important, it is rarely the overriding factor in determining job satisfaction for normal people.

Other things, such as job security, the scope for intellectual development, convivial working relations, power and control, social worth, physical location, and many other things determine whether people feel rewarded by their working life. I know many highly paid General Practitioners and Consulting Engineers who, in their 40s, really question the contentment they obtain from their work. Most are wealthy enough to afford a nice boat and luxury holidays, which provides a counterpoint to these thoughts, but does not account for their ennui! The solution to this problem is greater mobility in and out of career paths: many sociologists think that society will increasingly accommodate such mobility for people with the right "attitude".

Equally important to an individual's job satisfaction is employers' (or clients) views of employability and job performance. Here, it is common for many young job seekers to underestimate the importance employers attach to personal qualities as distinct from technical skills or specialist knowledge. Indeed, most employers would list personal qualities (such as grooming, posture, speaking ability, writing skills, general knowledge, ability to work with others, savoir faire, etc) as being more important than knowing how to solve Schrödinger's equation or to interpret a quasar spectrum. Many employers (and parents, too) think that there is a significant gap in undergraduate education because so little attention is paid to the development of personal qualities as opposed to technical knowledge.

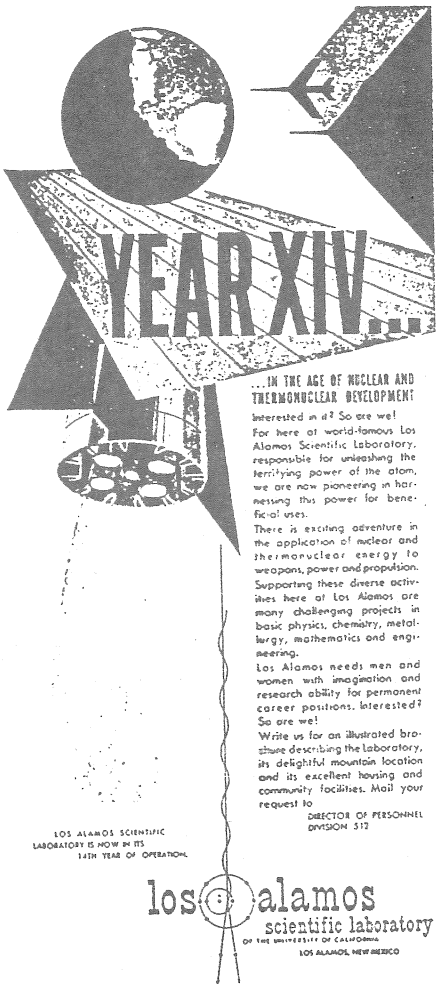
However, this criticism is not entirely fair. In our Physics laboratory classes, for example, you learn to work in small groups, to organize and plan a project, to explain by talking and writing, and to communicate with demonstrators (who are frequently also learning these kinds of things). Unfortunately, because laboratories don't seem to be directed at developing these skills, you don't necessarily realize what you have learned. You should realize that when you seek employment your resume and interview should bring out these matters.

The Job Market

In 1988, almost 50% of first-degree Science graduates moved into full employment within 6 months of graduation. Of the remainder about 10% were unemployed or employed part-time, and 40% were engaged in full-time further study. In Engineering, only 8% went on to further study. Conversely, very few Physics majors at Sydney University enter the workforce directly after their first degree.

This fact has led many commentators and parents to conclude that people trained in Physics find it hard to get a job, because so few enter the workforce immediately after their first degree (both the Bulletin and the Australian have drawn this conclusion). However, I don't think that this is the right interpretation. Rather, what happens is that people with a Physics major are generally those who are inclined to undertake rigorous advanced studies, ranging from 1 year diplomas (in Education for example) to a 3-4 year PhD program.

There are two consequences of this feature of Physics students. First, job destination and salary statistics for trained Physicists must consider higher-degree graduates (see below). Secondly, I am convinced that many



students are missing an opportunity to have a well-paid and rewarding job by avoiding Physics if they intend to enter the workforce immediately after graduation. Despite its reputation, Physics is in fact a simple subject in which competency is dependent on mastery of straightforward concepts and skills. Physics majors have a blend of technical and analytical skills that are very much in demand by public and private employers, and the small proportion of first-degree graduates who enter the workforce are quickly placed in rewarding positions. I would like to encourage undergraduates to seriously consider taking Physics in senior years, since I think that there is significant unsatisfied demand for such graduates in the workforce.

As mentioned above, most Physics majors enter the workforce with a higher degree. Of these students, the majority go overseas for postdoctoral experience, staying away from Australia for periods ranging from about 1 year to the rest of their life. Overseas postdoctoral training is important for establishing international contacts, for 'calibrating' yourself against the best young scientists in the world (Sydney graduates never feel inferior), and for developing research interests.

When Physics majors eventually enter the workforce in Australia, their employment patterns is as follows (based on 1989 statistics): about 45% to government positions (15% CSIRO, 10% military, 5% hospitals/medical), about 33% to tertiary education, about 13% to the private sector, 6% to school teaching and the remainder to various other destinations. Of these positions, about 50% have some element of security (eg academic tenure), and 50% are for a fixed term. The starting salary for a new PhD graduate is about $40,000 in the CSIRO, and $30,000 in Universities. In the CSIRO, most PhD scientists would be promoted until they reached a grade of Principal Research Scientist (in their mid-40s), with a salary of $63,000. The corresponding "career grade" in Universities has a salary of about $51,000. Very senior physicists in CSIRO are paid about $100,000 pa; few University physicists are paid more than $70,000 pa.

It is important to recognize that while most Physics majors work in physics research as the first step in their career, many move into management, sales, teaching, etc by the time they reach their mid-30s. Physics training, particularly when combined with 'short course' postgraduate training in finance, sales, management and so forth, produces people with skills that are a strong demand across a large part of the job market.

The Future

Many studies that seek to estimate the demand for physicists in the 1990s and beyond have been undertaken in Australia and overseas. These studies always predict a severe undersupply of physicists, because of increasing demand combined with a systematic 'aging' of the current population of physicists.

Despite its reputation, Physics is in fact a simple subject in which competency is dependent on mastery of straightforward concepts and skills.

However, as with all economic projections these predictions are not very reliable. It is possible that the demand will be even stronger than that predicted, or that the persistent recession and tightly, constrained government expenditure will restrict opportunities in the traditional job markets. What is clear, however, is that physics majors are likely to be more responsive to growth or resilient to decline in employment prospects, because their training equips them to be very adaptable, and their skills are readily transferred interstate or overseas, and to new kinds of employment.

At present in Australia, it is believed that there is a rough balance of supply and demand for physics graduates with higher degrees, with an undersupply emerging within a few years. Indeed, the School of Physics has recently encountered significant difficulties in hiring young physicists as lecturers, reflecting the growing shortage of PhD physicists willing to work under current University conditions. Maths and Physics teaching in High School is in a similar situation.

I think that one of the most important trends in science (physics) through the 1990s will be an increased emphasis on the end products of science as the topic of primary interest. Technology, particularly technology based on science, will increasingly occupy employers and educators. So called "basic research" will be carried out increasingly as a foundation for technological development, rather than as an activity in itself. This trend will provide wonderful opportunities for astute Physics majors.

In particular, if I am correct these will be a strong demand through the decade for people who understand the scientific basis of important technologies. The number of such people in Australia has been declining with the growth of "service industries", and consequently there needs to be a replenishing of the workforce in this area.

The kinds of knowledge and skills that I think will be needed encompass an understanding of measurement, materials, computers, natural phenomena and mathematical modelling, combined with well-developed "personal qualities" of the kind discussed above. While Physics is not the only discipline which develops these abilities, I think that training in Physics would place you in a very strong position in the job market of the 1990s. Most importantly, we know from experience that very, very few Physics majors ever come to regret their choice of study.

I hope that readers of Jeremy will seriously consider the advantages of a major in Physics - and of higher-degree studies, too. You will find that the academic staff of the School are delighted to discuss options and opportunities with you.

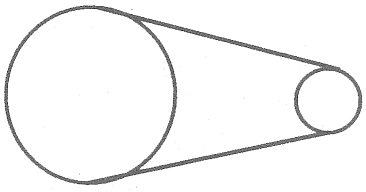
❑ *Professor Cram is the new head of the school of physics he takes over from Professor Max Brennan.*

Physics Forum

by John Gaunt

Physics Forum is back with a vengeance, not only have we the solutions to some of the problems, asked last time, but we have new and greater challenges for you, the reader to puzzle over, in those small hours of the middle of the night, and whenever else you have nothing to do. And if you come up with the solutions, send them in and you will be richly rewarded with a handful of *Kit Kats* . In this issue we have Bodie's last problem, one which will keep his memory alive long(and probably cursed after all traces of him have faded. There are also lots of other problems, plus lots of feedback.

Why Does It Stay On Here is the problem you have all been waiting for, the last problem of Bodie's. He has mentioned this to me, before the last issue, not due to space limitations it has been forced to wait until this issue. Bodie had been in the process of pulling his walkman apart when he noticed the following. The motor drove one wheel, which by means of a band, drove a smaller one, as shown in the diagram.



Top View

Side View

The question has to do with the cross section, of the wheels. Bodie tried to dislodge the band by moving it off centre, but somehow always returned to the centre of the wheel. Yet to look at the system it doesn't appear to be stable, and you would expect that if you moved the band that it would either come off or remain off centre. So why does the band return to the centre of the wheel.

Morning Tea About a week ago, we were sitting down at the sports centre, drinking a morning cup of tea. The tea there is served in polystyrene cups. If the tea was left on the table for a while, and then the cup was lifted, it caused a disk of moisture to appear beneath it. The cups bottom, had a ring around the edge, so there was a small space between the bottom of the cup and the table. Do polystyrene cups leak, or if they don't where does the moisture come form and why does it form on the table?

Mutant Girlfriend Without fail, every time my girlfriend gets out of a car she gets an electric shock. Now static electric shocks are nothing new or amazing. We've all received them or given them to friends at school by rubbing our feet on the carpets, indeed some professors, such as Prof Dick Collins still have a rather disturbing affection for the Van de Graff generator. But this is different.

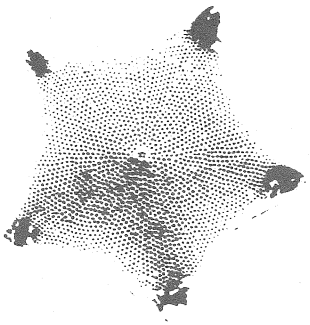
Often I'll have got out, closed the door and walked away receiving no shock, yet 10 seconds later a rather sad yelp will come from the passenger side door as my girlfriend is zapped again. The order appears to have no affect. Whether first or last she's always the one who gets shocked.

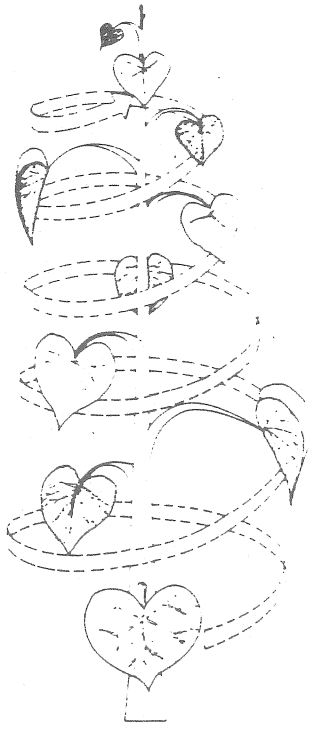
Furthermore she claims to have received shocks from peoples cats and other objects.

Is my girlfriend cyber-psychotic, or a perhaps a candidate for spontaneous human combustion? Anyone supplying **useful** answers to this question will receive bucket loads of *Kit Kats*.

FeedBack The response to the question about the bubbles in the coke has been quite overwhelming. There has been a number of solutions all of which have been along basically the same track. Namely that when you pour the coke over the ice the ice cracks and the increase in surface area means there are many more spots for the CO_2 to form into bubbles. This then explains why coke fizzes up so much more if you pour it over icecream, which is a lot rougher than ice.

Tom has sent in a similar suggestion, that the ice causes the coke to freeze, which acts as a nucleus for the bubbles. The only problem with this is that it does not explain why icecream is more effective, as if they are at the same temperature, then they should cause the same amount of fizziness.





The distribution of leaves around a central stem is governed by the Fibonacci Series: 3 leaves in 5 turns, 5 leaves in 8 turns.

The KitKat Quotes Competition

Reflecting the enthusiasm for submitting material to *Jeremy* in any shape or form, the number of quotes has fallen to an all time low. Being a third year student I'm well aware of the number of meaningless (ok stupid) comments even an average lecturer can achieve in one hour. However at Sydney Uni. where only the best will do, we have been blessed with such quotes factories as Dr Bill Tango"Four times four is about fifteen",Prof. Dick Collins"Choose a small flat volume",Dr Ian Johnston"This leads to General Relativity and Cosmology. We'll do that tomorrow" and they were only warming up. What's more you could win a lifetimes supply (anorexics only) of *Kit-Kats* i.e 1 whole box. However we have had a very good response from 4th year for some reason, however the rest of the years have been fairly slack, so get to it.

Martyin de Sterke:"Were going to use those dirty maths tricks again."
"All these plots come from the same mother of all plots."
"The temperature is kind of woopy here."
"This is not a rigorous proof but among friends we can argue."
"The good news is this is gorgeous stuff - the bad news is is its unfortunately wrong."
"Thermodynamic potentials were introduced to make life easier not just to make difficult homework sets"
"I give away part of the story here, we don't have any wiggles"

Don Melrose:"The point I'm making is somewhat obscured by the fact that the term is zero"
"I've just changed notation for reasons I don't understand."
"I had C in my notes and wrote G, but it should by F."

Ian Falconer:"Forget the bullshit Brian James told you."
"This may be cured by use of a tape which can be inserted in the appropriate bodily orifice."
"Where is the red chalk, how can you do a course on lasers without red chalk."
"Chemicals are pretty complicated molecules that you'd sooner not know about because you can't solve the equations"
"The trouble with radioactivity is that it doesn't go bzzz, or something like that"

Bill Tango:"I wont go into calculating Mueller matrices because I don't know how myself."
"The source here is roughly infinity."

Ross McPhedran:"There are a number of problems at the end of the chapter... I've done most of them and as a result have prematurely aged."
"The traditional method of solving such equations is to set them as assignment problems"
"And this gives us 10^{-12} seconds-which is not a very acceptable age for the universe, even on Biblical time scales"

Paul Robinson:"Yes, but don't forget the tokamak is just a large analog random number generator."
"No, quantum physics is not as funny as solid state physics"

FØRƎIGN QUOTES

Tony Lacy(Chemistry): "some clown comes along and discovers the photoelectric effect"
"every good theoretician carries his own Hamiltonian Operator round with him"
"we will consider this like a 1-dimensional dog living between two infinite confining potentials"
"you can either use commonsense or mathematics"

Dr Masters(Chemistry): "the next thing we do is make another unrealistic assumption"

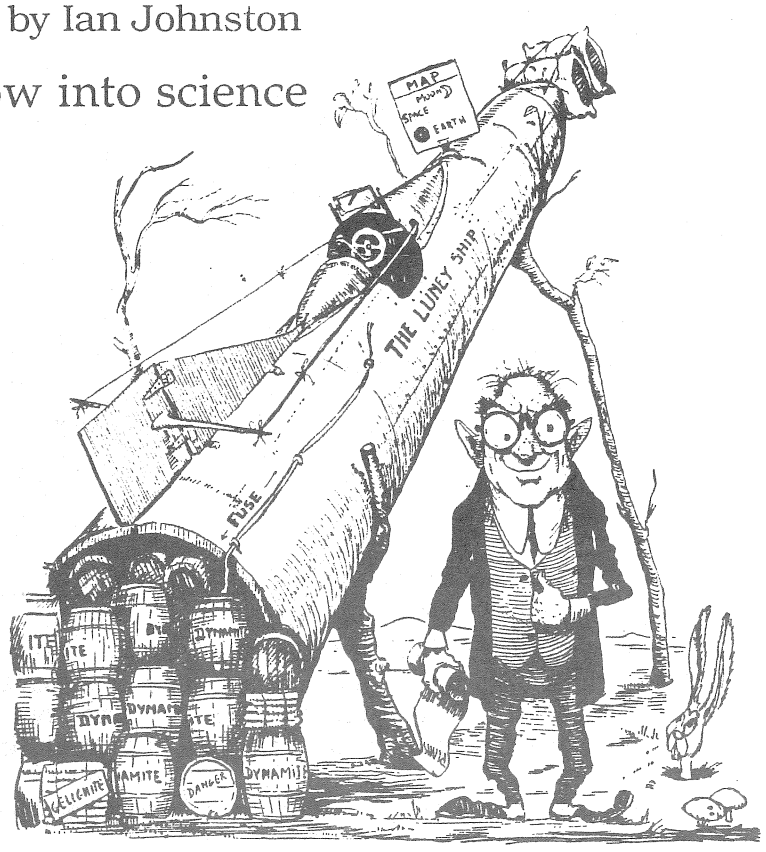
Humphrey Gastineau-Hills(Maths): "I'm going to pull something out which you may have seen before"

J

Science Fiction

by Ian Johnston

The average persons window into science



Science fiction is read by enormous numbers of people. Go into any bookshop and you'll probably find a section of the shelves devoted to nothing else. It's fast becoming one of the most important minority tastes in literature.

Many surveys have tried to find out if there is anything the readers have in common with one another. There doesn't seem to be. By and large they just seem to like a good story, as people have always done, but with this one difference. Science is a critically important part of the modern world we live in, and SF readers seem to like thinking about how this science affects that world.

The things that concern the readers, and writers, of SF are not confined, as many outsiders think, simply to foretelling the future. Some writers do that, but they're only a very small part of the whole scene.

There are, for example, the very technically minded who are turned on by purely scientific questions — the kind of thing that wouldn't seem out of place at the back of one of the chapters of Sears, Zemansky and Young.

• If a space ship kept accelerating closer and closer to the speed of light, so that it's crew aged more and more slowly than everybody else, might they run into the end of time (assuming of courses that we are living in an oscillating universe)? And if indeed the "big crunch" is somehow analogous to falling into a black hole, might they come *through* it and out into the next universe? If you want to know what at least one (reasonably well-informed) write thought in the 1960's, read Poul Anderson's *Tau Zero*.

• Could you imagine a race of beings that could live on the surface of a neutron star? The logic of the situation would suggest that they would live in a time scale some million times faster than ours. Civilizations would rise and fall in one of our days. How could you communicate with them, if every "person" you talked to died before you could finish a sentence? Read *Dragon's Egg* by Robert Forward and find out.

• How would the world appear to us if we could connect our brains directly to a computer network, and suddenly have access to more senses than our ordinary five? What would viruses, worms, artificial intelligences "look" like? William Gibson will tell you what he thinks in *Neuromancer* (and its sequels).

If you're not technologically minded enough to care much about those questions, you might still like to speculate about things like:

• Could you imagine a society in which people weren't always the same sex, but could sometimes be male and sometimes female? (*The Left Hand of Darkness* by Ursula LeGuin.)

• What is the nature of consciousness? If you transferred all someone's memories to another body, even a perfect clone, would it be the same person? (*The Worthington Chronicles* by Orson Scott Card)

• What sort of legal system will we have to evolve when organ transplants are so common that, given enough money, anyone could live essentially forever? (*The Long Arm of Gil Hamilton* by Larry Niven.)

I hope I've made the point. The range of ideas that science fiction writers explore are enormously wide. But though those ideas are central to what they write, they by no means define it. As with any form of literature, science fiction doesn't work unless the author can write well and tell a good story (which isn't quite the same thing).

The very, very best SF books are those which combine superb storytelling with a vast richness of ideas. Opinions differ about whether any particular book is "good" or not, but there are a few, a very few, novels which essentially everyone who likes science fiction have read. Isaac Asimov's *Foundation* (1948) comes into that category, and so does Frank Herbert's *Dune* (1965). I can't think of any others, though there was one published just last year which I think might, in years to come, prove to be in the same class. That is *Hyperion* by Dan Simmons. If you want a superb story and more

ideas than you can possibly come to terms with in one reading, try it.

That is the top end of the spectrum. Science fiction, at its best, bespeaks an intelligent, aware readership who are interested in and able to think about issues that are relevant to the everyday world, as well as to abstract science. But there is another end of the spectrum, and the attitudes it displays are, I think, not nearly so comforting.

If you look at what is on the SF shelves in any bookshop, even those who deal in nothing but SF like the Galaxy Bookshop in Castleraegh St, the kind of books that I have been talking about comprise less than about 20% of the whole. The rest are all fantasy — stories about dragons and princesses and magic. And this trend has been increasing in the last decade or so.

To me, that says that these readers, who have traditionally been interested in thinking about scientific ideas are retreating. It is as though they no longer think that science is a fit subject for their concern. They'd prefer not to think about it.

You can see much the same thing in the even more popular medium of SF movies. These have never been very strong on logic and thoughtfulness, but at least, in the 50's and 60's, they mostly seemed to be on the side of science. The clean-cut square-jawed young scientist usually got the girl and saved the world by the last fade. In recent movies however, you get the impression that the movie-makers think that science is irrelevant and scientists positively nasty.

Consider *E.T.* or *The Blob* or *Alien*. Strip away all the plot devices and love interests and monsters, and just think about the scientists in those movies. They do things like trying to kidnap the alien (nice or nasty) for no other reason than to study it, with no thought that it might have rights or be too dangerous. Acting just like the C.I.A. or the K.G.B., they actually seem to cause the whole trouble. No way do they save the world. It's left to the common (teenage) man or woman to do that.

Now that's not necessarily unworthy line, I will admit, but what does it say for science? There must be a lot of the general public who don't know much about science, and are going to be influenced by these movies. And these attitudes are coming from screen writers and directors who don't seem to know much about science.

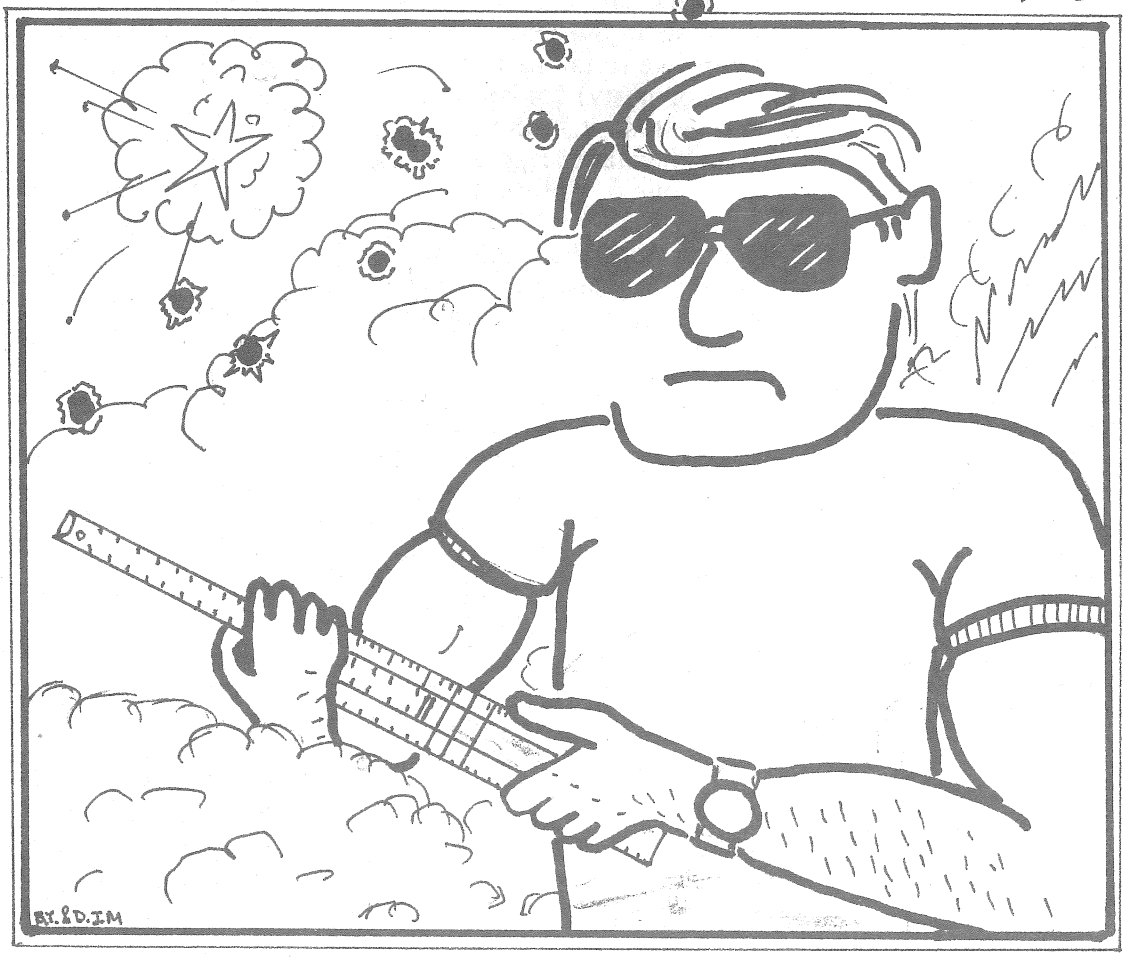
Where are those who *do* know, to argue the opposing case? It's the same old cry, isn't it. Science desperately needs communicators to help the rest of the world to understand what we are doing.

So, a plea to all you who are reading this issue of *Jeremy*. Some of you probably have writing talents (under-exercised in your science education, to be sure) and can tell a good story. And you (hopefully) know some science. Why don't you think about writing science fiction? You probably won't make any money out of it — you'll have to have a proper full-time job. But you won't be wasting your time or betraying your education.

Surely no one would dispute that Isaac Asimov has done more for the advancement science by writing SF than he ever would have had he stayed in his laboratory to do biochemistry.

DON MELROSE IS ...

THE COMMUTATOR



HE'S NOT A MAN ... HE'S THE COMMUTATOR

Part man, part mathematical entity. He was sent back in time to collapse the wavefunctions of third year students...

Underneath it's mathematically rigouous, very tough.

But the outside is living human tissue.

THERE IS ONLY ONE WAY TO STOP HIM—

ASK HIM IF HE'S GOT A MINUS SIGN WRONG...