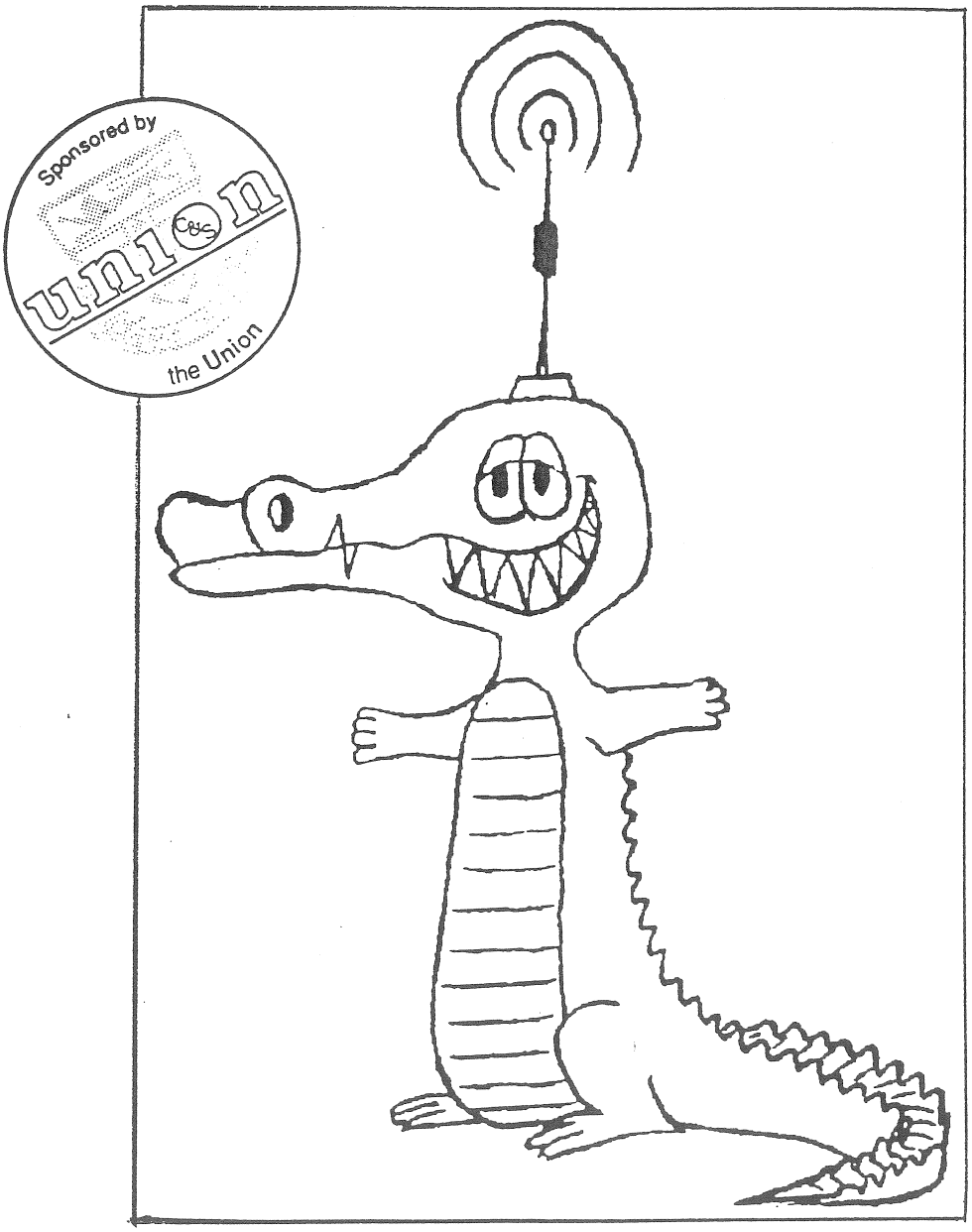
The Official Journal of The University of Sydney Physics Society

Jeremy



ZIPPER DYNAMICS
CREATION OF THE UNIVERSE
THE PHYSICS OF MUSIC

AND ALL THE REGULARS
PLUS COMPETITIONS GALORE !!!

CONTENTS

DISCLAIMER

The Editors of this magazine hereby claim that anything even remotely funny is a completely original example of the incredible wit (and modesty) of the aforementioned genii. This includes the bits borrowed from 'Science Made Stupid' by Tom Weller, published by Houghton Mifflin (1985). Naturally, any thing offensive, unfunny or spelt incorecttly is someone else's fault and absolutely nothing to do with us. Any major (or minor) terrorist groups wishing to claim responsibility for particular errors, please place an unmarked, ticking package in the *Jeremy* letterbox. If you would like to have an error in *Jeremy*, place it in the letterbox and we will blame you personally in the next issue.

DATCLAIMER

The Editors of this magazine hereby claim that we don't eat rocks, and try to avoid causing global nuclear warfare. We generally avoid massacring thousands of innocent civilians on the grounds tha 'we were bored and could't think of anything better to do'. Advanced Rabbit Taming is something neither of us participate in, and we don't sleep in caves on weeknights.

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REALLY SILLY BITS
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SELF GLORIFICATION
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EDITORIAL

Hello, and welcome to the first issue of *Jeremy* for 1993, with an extra huge welcome to all the first years out there. What you are now reading (probably while you should be listening to that droning sound being emitted from the front of the lecture theatre) is The Official Journal of the Sydney University Physics Society (Physoc). Although that sounds rather swotty and boring, hopefully you will find it jam-packed full of exciting articles and competitions, and helpful advice in the form of **Physics Forum.**

There are two ways we maintain the high quality of material in this journal:

1) **Pleading** : As in 'Please, please, please contribute to this magazine' , and the more effective...

2) **Bribery** : By entering our competitions (and winning) you could walk away with several dollars worth of prizes! Just look under the **Competitions** heading to see what's on offer.

Something that deserves to be mentioned is **Physics Forum.** If you find or invent an interesting or excellent problem then send it to us! We will publish it, so that all you people out there in physicsland can have a go at it, and we'll give it to our Official Physics Forum Problem solver, Sue Byleveld, from whom you can expect great leaps of insight that will leave you thinking 'Now I know why *I* didn't think of that !'

In case you haven't noticed (and unless you've been exploring the deepest, most unmentionable depths of the physics building you won't have) there is now a working Coke vending machine situated in the basement. Assorted softdrinks only **$1.00.**

Finally, despite a presidential decree banning any politics in *Jeremy*, we must mention that we are SHOCKED to hear that the Union elections will soon be happening, and hope that the forces of goodness and kindness and giving-money-to-physocness will win. And in a completely unconnected matter, good luck to Sally Teh in 2nd year physics (who also happens to be on the **Shocked** ticket in the Union election - but this has nothing to do with our mentioning her).

May the $m\frac{d^2r}{dt^2}$ be with you,

Matt & Daniel.

P.S. As you can see there is an excess of text in this edition of *Jeremy*. If you come across a cartoon or comic strip (or are clever enough to draw one) drop it in the mailbox (see **Competitions** for instructions on how to find it) and we will publish it!

P.P.S. Submit lots of stuff to Jeremy or we'll do something unpleasant to someone who doesn't really want it to happen to them!

PHYS PREZ SAYS.

Welcome to Physoc 1993. For those of you who are in your first year of University Physics - congratulations on getting here, have fun and good luck. To all of the older Physics people - great to see you again. And to those of you who picked up Jeremy when you were in the Physics building for no good reason - you're missing out on the best courses and the most fun faculty. (The lecturers read this too, and I really want that H.D. this year.)

We say a sad farewell to Tanya Feletto as the President of Physoc. Tanya was one of the driving forces that helped make Physoc the club it is today. Tanya is staying in the society as Vice President to make sure the new President doesn't do anything too rash.

The new President is ME - the one trying to write in full sentences rather than equations. I'm Emma Coen and I'm in my second year of Science which means I am more or less illiterate. The editors of Jeremy told me to lie when describing myself so I'm pale purple, have an Albert E. haircut, am interesting, witty and charming and I'm Zaphod's semi-cousin. (One of the above statements is true. No, not the one about hair.) *(The one about the colour ... Ed.)*

This year I'm head lunatic to the following bunch. We have a pair of Tanyas as Vice Prez and Secretary (Feletto and Hill). We have Neil Broderick as Treasurer and Cook. (NEVER let a Physics post-graduate be Treasurer. He's working on a method of book-keeping based on Maxwell's Law's.) The wonderful Ariane Blanche organises the parties with Geoff Facer and Brian Gaensler advertising them. A cast of thousands drink the punch, make fun of Neil's cooking and party all night. A pair of truly wonderful guys, Matt Sheumack and Daniel Burn edit this publication - a classic in it's time. (Just don't write anything nasty about me, please.)

Physoc is an exciting society. (Don't laugh. Any person or group of people dedicated to Physics is wonderful. I need that H.D.) We have lunch-time bar-be-ques and evening parties. If you missed the first ones, don't miss the rest. You can contribute to this wonderful magazine (You need something to do in lectures.) Dob in the silly things your lecturers say when their minds are elsewhere. You can meet people united in the causes of whining about their Physics assignments. Meet the lecturers. Realise that they say silly things even when their minds are here. Make friends and influence people. Get involved - even if it's just to wear the tee shirt and annoy the Chemistry students.

"If this is sanity, make the most of it"

Emma Coen.

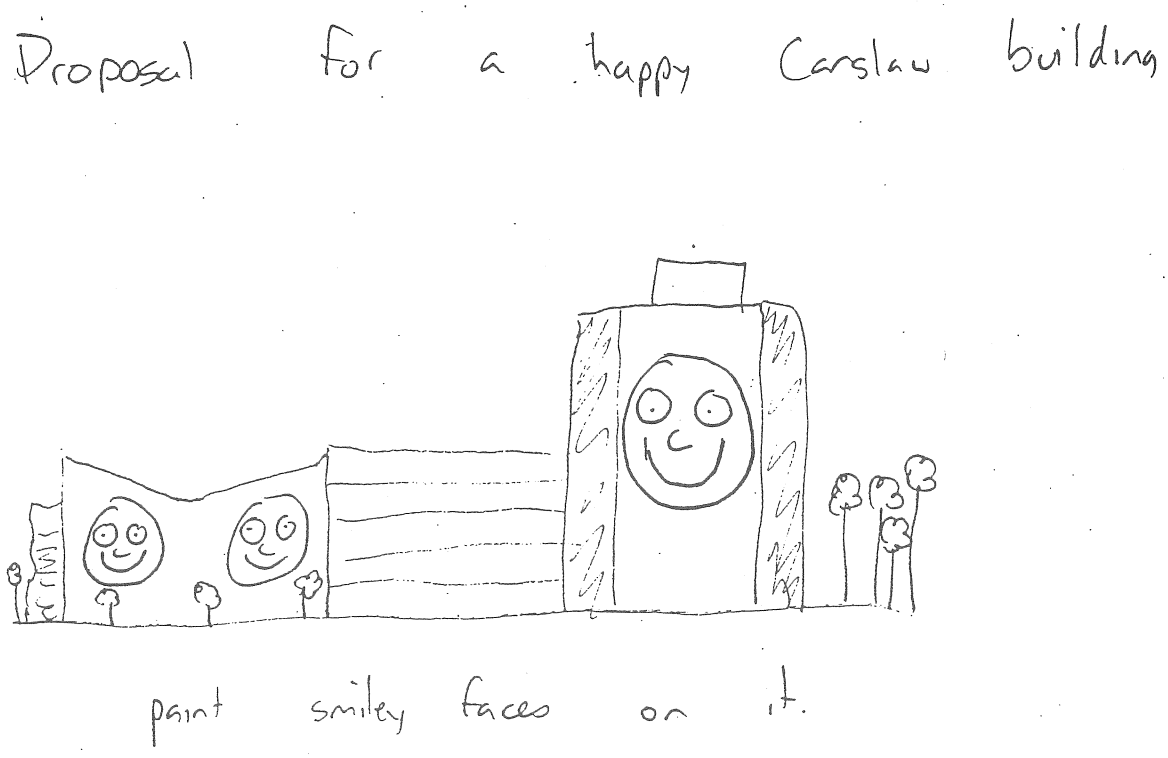
COMPETITIONS

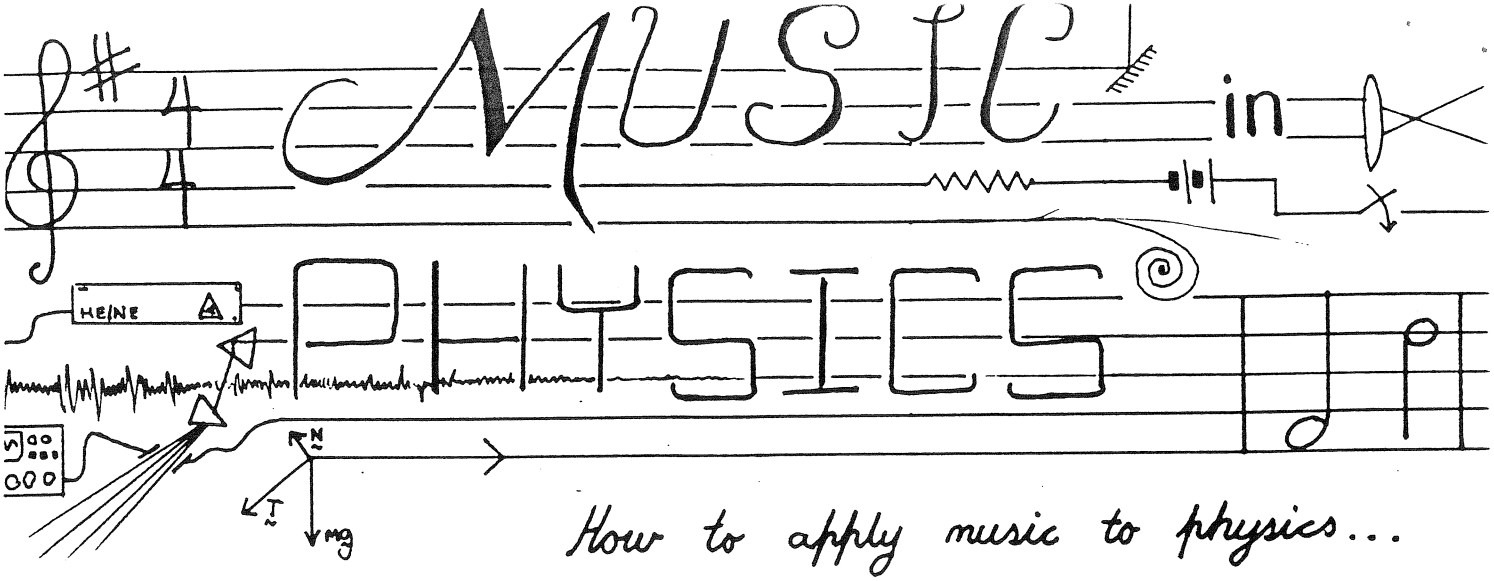
The Kit Kat Quotes Competition. This is where you can win a whole box of Kit Kats, generously donated by Rowntree - Hoadley, for the stupid things that fall from the mouths of academics. Some example entries appear in this issue of *Jeremy*. To enter simply write down your quote (or quotes, it is rare that the foot only enters the mouth once), make sure you include both your and the lecturers name, and place it in the *Jeremy* letter box behind the door in the foyer outside Lawrence Cram's office outside LT8 in the house that Jack built.

The Dud Theory Competition. Do you have a really great theory just waiting for publication ? Well then go away, we only want funny ones. Seriously though, if you have an interesting theory on any topic, we want to publish it. But it should be funny, or have a very tenuous link with reality, or something like that. Basically anything that falls under the title "Dud Theory" will do. A good example is economics, which is both funny and completely surreal. The best one will receive a $60 book prize.

We need a new T-Shirt!!!! If by some bizarre juxtaposition nature has blessed you with both scientific and artistic talent, there is a $60 book prize (and a new Physoc T-shirt) up for grabs. Two designs will be chosen, one each for front and back. At least some of the designs should contain the words 'Physoc' and 'Jeremy' and feature a crocodile. All designs entered must be totally original and be presented in glorious black and white. Entries to the *Jeremy* Letterbox.

Remember, you will not just be competing for these fabulous prizes, you will also be achieving glorious fame among our many millions of readers. Think of how your friends will bow their heads in awe. Think of how children will point you out in the street, saying 'Look, Mother, there goes a *Jeremy* contributor!'. This is the real reward of writing for *Jeremy* .





How to apply music to physics...

WARNING: This is examinable material.

♩	crotchet
$\dot{\vec{\ell}}$	crotchet vector
$\dot{\ell}$	$\frac{d(\text{crotchet})}{dt}$
𝄞	turbulent flow
≡	laminar flow
Major	3rd year Student
Minor	1st year student
Diminished	2nd year student
Augmented	4th year student
Perfect	What the staff like to call themselves.

tr ⏦	thermal resistor
accelerando	$\frac{\text{velocetti}}{\text{timelli}}$
‖	capacitor
mp	malicious physics
♯	The start of a noughts & crosses game in a physics 1 lecture.
𝄢	cloud chamber track
𝅝	your end of year mark, if you didn't attend lectures

The KitKat Quotes Competition

LOCAL (NO CHOLESTEROL) QUOTES:

"A good Laser should bend over"
Stuart Ramsden

"To do this experiment, you need an infinite number of rooms and an infinite number of geiger counters - that's why physics is expensive"
Dr. Ian Johnston

"It's absolute in a relative kind of way"
Prof Dick Collins

"...the formula tells you - the formula's talking, wacko!"
Dr. Brian McInnes

"By the fundamental theorem, Gauss' Law becomes Gauss' Law"
"Maxwell's equations apply even when we are moving at different speeds with respect to each other"
Dr. Bill (2 2) Tango

"The sun is a good approximation of a hot object"
Dr J. O'Brien

"The Doppler Broadening is governed by the ... ah ... doppler broadening"
John Davis

UNWHOLESOME ALIEN PRETEND STRAP-ON LECTURERS (IE. NOT PHYSICS):

"Whenever I say two different things, write down the one that's correct."
Dr Adrian Nelson (Pure Maths)

"In this type of experiment you measure until they die, or progress, or whatever the appropriate definition of death is"
"In the statistics division, we are having a lot of trouble convincing the pure and applied mathematicians that in statistics, you sometimes need to write words"
Neville Weber (Math Stats)

"So we'll shift each function by κt. (Sighs) I could use a nice hot kappa tea right now"
Malcolm Quine

MISCELLANEOUS INDIVIDUALS:

"...but they're not the same; one's light and one's electromagnetic radiation"
an HPS student

"Why don't the rampant !@$§¶ ®¥•%$©s send us more %$*^*¶§ @% quotes!"
unknown Jeremy editor searching for articles in the jungles of Brazil

Here is an example of a dud theory. Allow it to inspire you to create your own and submit it to *Jeremy*!

THEORETICAL ZIPPER DYNAMICS

HARRY J. ZIPKIN
Department of Unclear Physics, The Weizipmann Inziptute

INTRODUCTION

The fundamental principles of zipper operation were never well understood before the discovery of quantum theory[1]. Now that the role of quantum effects in zippers has been convincingly demonstrated[2], it can be concluded that the present state of our knowledge of zipper operation is approximately equal to zero. Note that because of the quantum nature of the problem, one cannot say that the present state of knowledge is *exactly* equal to zero. There exists certain typically quantum-mechanical zero-point fluctuations; thus our understanding of the zipper can vary from time to time. The root mean square of our understanding, however, remains on the order of h.

ZIPPERBEWEGUNG

The problem which baffled all the classical investigators was that of 'zipperbewegung'[3], or how a zipper moves from one position to the next. It was only after the principle of complementarity was applied by Niels Bohr[4], that the essentially quantum-theoretical nature of the problem was realised. Bohr showed that each zipper position represented a quantum state, and that the motion of the zipper from one quantum position to the next was a quantum jump which could not be described in classical terms. and whose details could never be determined by experiment. The zipper just jumps from one state to the next, and it is meaningless to ask how it does this. One can only make statistical predictions of zipperbewegung.

The unobservability of zipperbewegung is due, as in most quantum-phenomena, to the impossibility of elimination of the interaction between the observer and the apparatus. This was seriously questioned by Einstein who, in a celebrated controversy with Bohr, proposed a series of experiments to observe zipperbewegung. Bohr was proved correct in all cases; in any attempt to examine a zipper carefully, the interaction with the observer was so strong that the zipper was completely incapacitated[5].

THE SEMI-INFINITE ZIPPER

A zipper is a quantum mechanical system having a series of equally spaced levels or states. Although most zippers in actual use have only a finite

number of states, the semi-infinite zipper is of considerable theoretical interest, since it is more easily treated theoretically than is the finite case. This was first done by Schroedzipper[6] who pointed out that the semi-infinite series of equally spaced levels was also found in the Harmonic Oscillator discovered by Talmi[7]. Schroedzipper transformed the zipper problem to the oscillator case by use of a Folded-Woodhouse Canonical Transformation. He was then able to calculated transition probabilities, level spacings, branching ratios, seniorities, juniorities, *etc*. Extensive tables of the associated Racah coefficients have recently been computed by Rose, Bead and Horn[8].

Numerous attempts to verify this theory by experiment have been undertaken, but all have been unsuccessful. The reason for the inevitability of such failure has been recently proved in the celebrated Weisgal-Eshkol theorem[9], which shows that the construction of a semi-infinite zipper requires a semi-infinite budget, and that this is out of the question even at the Weizipmann Inziptute.

Attempts to extend the treatment of the semi-infinite zipper to the finite case have all failed, since the difference between a finite and a semi-infinite zipper is infinite, and cannot be treated as a simple perturbation. However, as in other cases, this has not prevented the publishing of a large number of papers giving perturbation results to the first order (no one publishes the higher order calculations since they all diverge). Following the success of M. G. Mayer[10] who adapted spin-orbit coupling to the harmonic oscillator, the same was tried for the zipper, but has failed completely. This illustrates the fundamental difference between zippers and nuclei and indicates that there is little hope for the exploitation of zipperic energy to produce useful power. There are, however, great hopes for the exploitation of zipperic energy to produce useless research.

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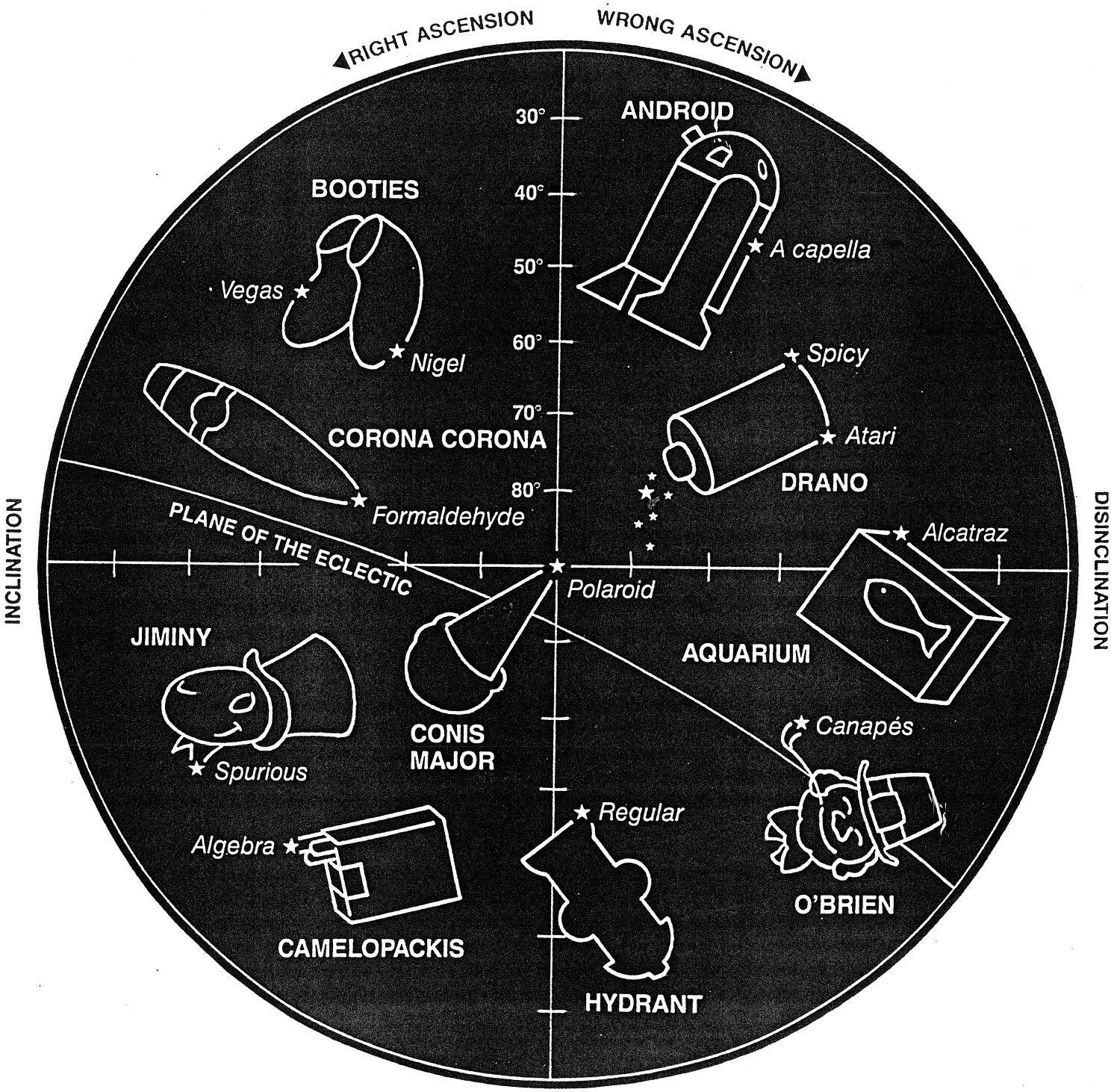
(From J.-M. Levy-LeBlonde 'Quantics; Rudiments of Quantum Physics' *Elseveir Science Publishers* (1990))

Pictures in the Sky

The ancients looked at the heavens and saw the shapes of gods and animals in the stars. This was probably due to widespread drug abuse in ancient times. Nevertheless, we still use the names they gave the constellations.



Constellations Visible from the Northern Hemisphere

CREATION OF MATTER IN THE EARLY UNIVERSE

Firstly, let us assume that by some quantum fluctuation, a proton is created out of nothing. Thus we begin with a universe consisting of a single proton. The aim of this paper is to demonstrate conclusively that if we begin with such a universe, the present one evolves directly out of it.

The theory:

We have a proton, with mass 1.67×10^{-27} kg, and charge 1.6×10^{-19}. Calculate the electric field($\underline{E}$) at 3.1m:

$$\underline{E} = \frac{Q}{4\pi e_0 r^2} \hat{r}$$

$$= 1.5 \times 10^{-10}$$

but, as we all know,

$$E = mc^2$$

$$\text{ie. } m = \frac{E}{c^2}$$

so m at r = 3.1 m is 1.7×10^{-27}.

So we have a proton at the origin (forgive the pun), and something of mass 1.7×10^{-27}, 3.1 m away from it. But this mass is the mass of the proton, and so we have another proton spontaneously created 3.1m away from the first.

Now this process looks like it will just run away in a chain reaction until the universe is full of protons. On the other hand, we clearly have a non-growing universe (of mass 10^{78} proton masses). So there appears to be a problem with the theory.

But the observant reader will have noticed that we have forgotten one thing. Charge is not conserved. So electrons must be made to account for the imbalance (other exotic particles (such as hyperons, etc.) will appear in this race to balance the charge, but they will decay into the normal particles, giving off light in the process and thus creating all the light which we see about us). The electric imbalance levels off at about the present level, so that when the universe reaches about the size of our own, the total charge is zero.

Thus the creation of the universe is explained, and many other things as well. We can see that in this present epoch, the total charge is zero. Hence the $\underline{E}$ field is zero everywhere, and no new mass is created. Were this not the case, it would be shown be the following simple experiment. Hold out your hand. If it possesses any charge, it will be surrounded by an $\underline{E}$ field, which will create more protons. Careful experiments show that no protons are spontaneously created 3.1m away from the hands of several researchers, so it can be deduced that the electric field at every point in the universe is zero.

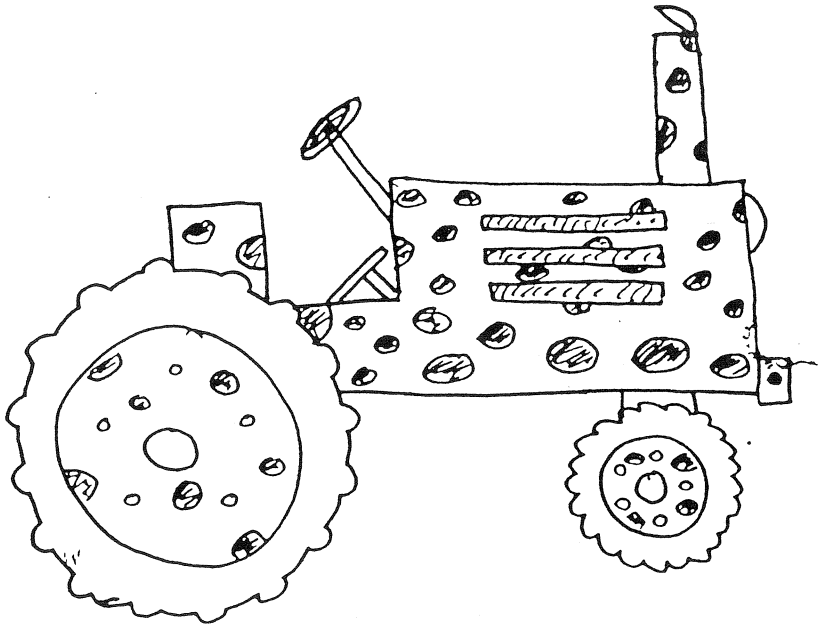
Postscript :

My colleagues (Mr Gourami) and I are currently working on a theory which starts with a single neutron and creates the universe. If there is sufficient public interest it will be published.

Footnotes:

We don't need any because this theory is entirely self sufficient.

A strange tractor



A stranger tractor