

Carlos Castro's Cosmological Model of Pioneer 10/11 Anomaly

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From: Jack Sarfatti (sarfatti_at_pacbell.net)

Date: 10/16/04

Date: Sat, 16 Oct 2004 17:59:42 GMT

bcc

On Oct 16, 2004, at 2:49 AM, Carlos Castro wrote:

"Dear Friends :

Thank you very much for your last mails.

There is a lot, a lot, a lot of confusion that I need to clarify so that errors and misunderstandings will not propagate in the internet :

1- I sent Brian 3 files, however, the one on the

"Dual Phase Space Relativity, Mach principle and Modified Newtonian Dynamics"

has nothing to do with Clifford Geometric Algebras. It is only based on Max Born's Dual Relativity Principle in Phase Spaces and Ernst Mach.

This is the paper that can be understood by everybody, by an undergraduate because there is no fancy Math at all. This is what I meant.

2- An important (in my opinion) finding is based on the maximal proper force in Nature = related to Born's Dual Principle of Relativity combined with Mach's ideas about the interplay among all of the masses in the Universe : the micro-world with the macro-world."

I agree that this is an interesting conjecture. The conjecture formally is

$\mu_{pc}^2/L_p \sim \mu_{cH} \sim c^4/G = \text{superstring tension.}$

This is "Goldstone phase rigidity" or "space-time stiffness" in my

macro-quantum coherent Higgs Ocean theory.

How do you connect it to the math of Born's Dual Conjecture? I will see if I can understand what you say about that in your paper.

You make the interesting prediction that $\sim 10^{-7}$ cm/sec² is the smallest possible acceleration that can be measured. I bet it is not true, but if it is, very important.

I do not see why Pioneer 10/11 at only 20-70 AU from us should show that effect, and why in your model it points back to Sun. I do explain all that in my model in a falsifiable way that connects to inflationary cosmology.

"I just equated the maximal proper force =
 $F = \text{Planck mass} \times (c^2 / \text{Planck scale})$
with an upper value of a Mass (" universe ") times
a minimal $a = (c^2 / R)$,
if we identify $R = \text{upper scale} = \text{asymptotic value of Hubble radius.}$ "

Yes, but WHY should that apply to Pioneer 10/11? This is a logical gap I am not able to cross.

"and from here ... I end up with the Dirac-Eddington number $10^{\{ 80 \}}$ and $10^{\{ 80 \}}$ protons = M , etc ...

etc...."

Yes, but that is outmoded

"3- I took a look at Jack's pdf file of 6 pages. Unfortunately he says a lot of things which are incorrect. He needs to correct them as soon as possible so errors do not propagate in the internet."

I see no errors other than a very minor 4pi typo that I fixed last night before I even read Tony's message on it. If you see any errors spell them out. It is not enough to say there are errors without being specific. If you point out any that really are physical conceptual errors I will correct them. I am publishing this soon, so any errors you see will be corrected.

"The paper I mentioned above in items 1, 2 has nothing to do with a fractal spacetime, nor q-deformations, nor Clifford Geometric algebras etc... nothing to do with that at all .

What I was saying is that the Pioneer anomaly COULD be just a result of Ernst Mach's ideas and Born's Dual Principle of Relativity. This is ALL."

That is not good enough. That does not qualify as a properly posed explanation to my mind. All you can say here is that there is an interesting coincidence between the Pioneer 10/11 anomaly and the number cH . You have not explained anything there. You need to show a model WHY Pioneer is showing cH and why the anomaly points back towards the Sun. You have not done that at all to my mind. I have. My model may be wrong, I don't think it is, but it does make sense in terms of Newton's potential theory, i.e. weak curvature, low test particle speed limit of Einstein's GR. It is obvious in my model why the direction. It is completely obscure in your model.

"It does not require any fancy Math, nor Clifford algebras, fractals, q -deformations, strings as Jack implies. It is NOT true and needs to be corrected."

Oh, is that what you mean by "errors"? That was a general comment. I think now we agree that your Pioneer remark has little to do with the powerful math in your papers that you said I must understand before I could understand your Pioneer remark. Now you seem to be back-tracking on that.

"4- Nottale's explanation of the Pioneer anomaly has nothing to do with fractals."

Perhaps, but it should.

"It is all based on Mach's principle."

How? Spell it out thanks.

"Nottale just reconciles a local coordinate system with a global one by simply matching two metrics at the orbital distances of the Pioneer spacecraft. This is all he does. His number has a square root of 3 floating around so it is not exactly equal to c^2 / R ."

This makes no sense to me at all. I would need to see it spelled out in detail. I don't care about $3^{1/2}$ or 4π factors at this stage. I need to see what the idea here is. All I need in my model is Newton's gravity theory – Physics 101 and the idea of the exotic vacuum halo centered on the Sun with a plausible functional dependence that fits the data easily.

"5- I discussed the Pioneer anomaly because I wanted also to refer to the work of Nottale on this subject that was based on Ernst Mach ideas."

These, so far, are loose associations that need conceptual tightening to be understood. I am not saying these connections are not there, but they

need much more explaining. Mach's ideas are outmoded BTW. I would not bet on Mach's ideas based on a primitive notion of "matter" – not since 1999 at least. Before then, maybe.

"My " interpretation " of the Pioneer anomalous acceleration was that if the universe was created out of the vacuum, as a Planck–size bubble vacuum fluctuation (or an statistical ensemble of bubbles) that was initially accelerating (expanding)with a maximal acceleration

$$a = c^2 / \text{Planck} , \text{ etc...}$$

where the Planck scale is the minimal scale,

then as matter/radiation is being created via the Unruh–Rindler–Hawking effect (due to the acceleration w.r.t vacuum) then the acceleration of the our bubble–universe begins to slow down and down and eventually it will reach the minimal acceleration

$$a = c^2 / R$$

due to the postulate of a MAXIMAL scale in Nature."

Oh! OK. If you had said that in the first place, that would have avoided a lot of confusion. All you need to have said was that. Instead, you told me to go read all the math in your papers instead of clearly stating you intuitive idea that is easy to understand. OK I will quote you on that. So you are then predicting something like the Hubble expansion where every point of observation is the "center". You are saying that ALL objects, no matter where or when should show this effect. This is not peculiar to to Pioneer 10/11.

Also, we need not to confuse this with Tony's cH, which is different.

Your "R" is my $L_p R(t)$.

We are now both saying

$$a \sim c^2 / L_p R(t) \neq cH \text{ although the numbers happen to be similar.}$$

Therefore, t will be different for different objects in the sky. So your intuitive idea here makes sense to me now, and seems to be a falsifiable plausible cosmological alternative to my more local exotic vacuum halo model. Both models make different predictions and can be tested. OK, that's progress.

Had you simply said initially, that the observation of the Pioneer anomaly is the red–shifted stretched out maximal acceleration from the Big Bang and that the Pioneer Anomaly is pointing to a UNIVERSAL effect

that should be seen in all distant objects, then I would have understood you. The direction of the effect comes from the isotropic homogeneous stretching of the dimensionless FRW $R(t)$ scale factor, the same in every direction. I am not saying that your explanation is the right one, but now at least I understand what your idea is and we do not need any of the fancy math.

"Hence, if the bubble–universe as a whole is accelerating today with respect to a preferred frame of reference = the vacuum, there is a non–inertial " pseudo–force " acting today on the Galileo–Pioneer spacecraft of the order of $a = c^2 / R$, directed towards the sun, that agrees with observation."

This part I do not understand. This $c^2/LpR(t)$ should already be part of the Hubble flow.

That is, for example in

$$v = Hr$$

or

$$R(t)/R(0) = 1/[1 + z(t)]$$

where the convention is $t = 0$ is NOW.

So infinite z is the big bang, and now is $z = 0$ with $z > 0$ RED SHIFT from the past and $z < 0$ = BLUE SHIFT from the future. Note that $R(0) = 10^{61}$ in units of Lp .

The idea is that the source and the receiver are both at "rest" in the local Hubble flows. Any additional z comes from Doppler motion relative to Hubble flow.

You are positing something similar for rate of change of z . That is, something like

$$dz(t)/dt = mpc^2/hR(t)$$

Where $R(0) = 10^{61}$, $t = 0$ is NOW in this convention.

This is a different convention from my use of $t' = h/kTcbr$

$$t = t' - h/kTcbr(now)$$

"Concluding, it is my opinion, that there is no simple explanation of the Pioneer anomaly unless we invoke Ernst Mach ideas and Max Born's Dual Principle of Relativity."

I strongly disagree. I see no logical necessary connection of the basic idea to either Mach's or Born's conjectures neither of which have proved useful in modern physics – so far.

"This is a new paradigm in physics and there is nothing simple about this as Jack pretends it to be in his file and e-mails."

I agree that your paradigm is not simple. In contrast, mine is. So it is a matter of parsimony in the philosophy of physics. The simpler model that covers the empirical domain is always to be preferred assuming both are correctly done of course. I also say that your basic testable idea has no necessary connection with your Mach/Born Paradigm. It may be compatible with it, but it stands on its own two feet and has several different plausible interpretations.

"The new book by Stephen Adler on Quantum Theory as an emergent Phenomenon is what Garnet Ord in Canada and Laurent Nottale have been saying for years : A fractal spacetime interpretation of QM."

Let's stay on one problem at a time. This is a tangent – interesting but best to stay focused on the issue at hand.

On Oct 16, 2004, at 9:15 AM, Jack Sarfatti wrote:

While I think Carlos's paper is full of interesting mathematics that may have importance to real observational physics, I am not at all able to understand how he explains the direction of the Pioneer anomaly observation. Even his explanation of the magnitude of the effect has a logical gap in it that my mind so far is not able to cross. In contrast I have a simple mainstream falsifiable model for the observations. So my interest is to compare my model with Carlo's model ONLY for that observation at this time. I will of course cite Carlo in a paper with a top NASA scientist I am writing that will be rushed into print because the Pioneer observation is so important.

Carlos makes one interesting prediction that can be tested that I will mention in my paper on Pioneer 10/11. He says that the observed Doppler shift drift rate $\sim cH$ from current Pioneer 10/11 only 20–70 AU from us is the SMALLEST POSSIBLE IN PRINCIPLE! This is an interesting prediction. I don't believe it is true, but if it is, it is major and I will call this the "Castro Conjecture" in the paper to be written with the NASA scientist.

If someone else understands Carlos's explanation of the Pioneer Anomaly please write up what it is you understand.

Note that my formula for the Pioneer Anomaly is not same as Carlos's and I have a natural explanation for it's direction back to the Sun.

My formula is $\sim c^2/LpR(t)$

Where $R(t)$ is the dimensionless FRW scale factor.

At present epoch $R(t) \sim 10^{61}$

$t \sim 13.7$ billion years

Note that $H(t) = R(t)^{-1}R'(t)$

On Oct 16, 2004, at 6:23 AM, Brian Josephson wrote:

—On Saturday, October 16, 2004 2:49 am –0700 Carlos Castro <czarlosromanov@yahoo.com> wrote:

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Hmmm! I still feel it optimistic to feel that an undergraduate would be happy with the quote below, taken from page 2 of what appears to be the paper you cite. Perhaps the trick is to skip over §1, and begin the paper with §2 instead. That would be an interesting tactic!

Yes, Carlos over–estimates the ability of undergrads. I know it would take me at least weeks to understand the math in Carlos's papers sufficiently well. Saul–Paul Sirag can understand the math quicker. My primary interest now is in understanding the observations of precision cosmology and I am not yet convinced that Carlo's math is needed for that. I am not saying that it is not needed. However, I understand that the evidence so far is against one of the key predictions of theories like Carlos's and others that deep space gamma rays will show the kind of dispersion that his model predicts – no evidence really for quantum foam. My theory has no quantum foam!

=b=

A Clifford–space dynamical derivation of the stringy–minimal length uncertainty relations was furnished in [38]. The dynamical consequences of the minimal–length in Newtonian dynamics have been recently reviewed by [37]. The idea of minimal length (the Planck scale LP) can be incorporated within the context of the maximal acceleration Relativity

principle [18] $a_{max} = c^2/LP$ in Finsler Geometries [10]. A different approach than the one based on Finsler Geometries is the pseudo-complex Lorentz group description by Schuller [11] related to the effects of maximal acceleration in Born-Infeld models that also maintains Lorentz invariance, in contrast to the approaches of Double Special Relativity (DSR) [20] where the Lorentz symmetry is deformed. Quantum group deformations of the Poincare symmetry and of Gravity have been analyzed by [19] where the deformation parameter q could be interpreted in terms of an upper and lower scale as $q = eLP/R$ such that the undeformed limit $q = 1$ can be attained when $LP \rightarrow 0$ and/or when $R \rightarrow \infty$ [18].

Brian

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