Re: "Deep Impact" predictions

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- *From*: "Tom Van Flandern" <tomvf@xxxxxxxxxxxx>

- *Date*: Thu, 11 Aug 2005 02:28:48 −0400

The message this replies to is lengthy, but I have worked on it as time permitted over the last 10 days. I dealt with most but not all points raised. However, the subject sprawl is getting large. And coming travel will severely limit my future responses. So comment as you wish; but if anyone needs a further response on a point or two, please so indicate.

"Paul Schlyter" <pausch@xxxxxxx> writes:

>> [tvf]: Geometric GR has two giant disadvantages because it violates
>> two principles of physics (causality and "no creation ex nihilo") as
>> I explained in my last post, which falsifies it for many practical
>> purposes.

> [Schlyter]: Who defined those principles? Yourself?

The particular list I posted in my "Physics has its principles" paper (web version at http://metaresearch.org/cosmology/PhysicsHasItsPrinciples.asp) arose from a consensus of physicists attending a conference about fundamental principles held in Sutton, Ontario in October 2002.

The principles of physics (by contrast with the laws of physics) arise from logic alone, and do not depend on observations or experiments. For example, one of them is "no creation ex nihilo", which is pretty self−evident provided that one understands that it means "you cannot get something from *literally* nothing", although there is no problem getting something out of the vacuum or what appears to be nothing. As is now well known, the vacuum is filled with zero−point energy, fields, radiation, and other forms of substance. Getting something from an invisible source is not a problem. Getting something from a true void requires a miracle. Miracles are not generally considered to be impossible, but are outside the realm of explanations considered by physics. (See my answer to a later question for more about why miracles are excluded by physics.)

> [Schlyter]: I think you'll find it hard to merge your request for
> causality with some quantum mechanical effects. Such as Heisenberg's

> uncertainty principle, the "tunnel effect", etc.

I found no problem with these concepts when strict
principles of physics are adhered to, as you can read for yourself in
chapter 5 of my book "Dark Matter, Missing Planets and New Comets"
(North Atlantic Books, Berkeley, 2nd ed. 1999). But QM is far afield of
our discussion here. Let's try not to multiply discussion threads so
much. I'll simply hint that all of QM starts making sense again once we
do away with the constraint that "nonlocal" actions are forbidden. As
you know, my published papers show how the speed of gravity is an
example of faster−than−light action in forward time, which is "nonlocal"
by the QM definition.

> [Schlyter]: So we can conclude that your request for causality in each
> and every situation is contradicted by observation at the quantum
> mechanical level. Yes, it's counterintuitive. Yes, Einstein disliked
> it too, but eventually he accepted it, since what counts is
> observations and experiments, not human ideas.

Human logic is as important (and arguably more important) as
observations and experiments. Our interpretations of the latter (such as
the laws of physics) are fallible and subject to evolution or even
contradiction. But valid logic is immutable and provides the only true
certainties we have. Because we cannot regress cause and effect
infinitely far back, we must ultimately rely on logic for our first
principles. To base them on observation or experiment is to build models
on quicksand because there are no observers of a "First Cause".

>> [tvf]: . neutron interferometer experiment .

> [Schlyter]: Now you've entered the realm of quantum mechanics. GR is a
> classical physical theory which is no longer valid in the quantum
> mechanical realm.

Is that the Schlyter theorem? This is the first I've heard
that the laws of gravity do not apply to quantum particles such as in
the neutron interferometer. Using geometric GR, how do these particles
manage to escape noticing that the spacetime they are embedded in is
curved? Why are their motions exempt from conforming to the geometry
that macroscopic bodies must follow? In short, why does the equivalence
principle hold only for macroscopic bodies and not for quantum
particles, as you seem to be hypothesizing here?

> [Schlyter]: Perhaps the initial attempts of merging QM and GR is
> easier with your field interpretation of GR, but that's because "field
> GR" appears somewhat more similar to NP (Newtonian Physical) than
> "geometric GR".

Field GR is the interpretation preferred by Einstein, Dirac,
and Feynman. So it seems rather inappropriate to act as if it is somehow
inferior or not "real GR".

> [Schlyter]: I don't see why there's more "magic" in geometry than in
> "action over a distance" which the "force of gravity" really is.....

True "action at a distance" is also forbidden by logic, although there is nothing wrong with the mere appearance of action at a distance carried by entities too small to detect. As applied to understanding gravitation, that is what the Le Sage "pushing gravity" idea is all about − a description of carriers of gravitational force from a source mass to a target body that appears to simulate action at a distance.

> [Schlyter]: But this means we both agree on this:

−−

A collection of macroscopic bodies (i.e. bodies large enough such that QM effects become negligible) in an otherwise empty universe, which initially are at rest in space relative to one another, will start to move due to their mutual gravitation. And this is predicted both by geometric GR and by field GR, and they both predict precisely the same trajectory for each body.

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Can we agree on this? Or do you claim that in this scenario geometric GR will yield a different prediction compared to field GR?

Geometric GR by itself describes only the potential field and contains no forces, so by itself it is unable to explain any motions of material bodies in 3−space. Both geometric GR and field GR adopt the axiom that force is the (instantaneous) gradient of the potential, in order to derive equations of motion that allow them to predict 3−space motions with respect to time. With that caveat, yes, they both predict the same 3−space motions − but definitely not by geometry alone. Geometry has no cause that can initiate motion. Only a force can do that, force being the time rate of change of momentum by definition.

In short, the alleged "geometry" and "curvature" exist only in the potential field, but neither concept does anything about initiating the 3−space motion of target bodies. It takes a force to do that.

> [Schlyter]: Your causality principle is flawed. It works well in
> Newtonian Physics but fails in . GR (your flawed conclusion that
> geometric GR says that those bodies initially at rest in space will
> remain in rest just because gravity is a pseudo−force. Your flaw is
> corrected by integrating space and time to space−time, instead of
> keeping them separate as you insist on doing, like in Newtonian
> Physics).

Newtonian physics is not involved in this discussion in any capacity. When you use the expression "Newtonian physics", it seems apparent from context that you must mean "Euclidean flat−space geometry". So I will interpret your sentence to mean that and answer it

accordingly. If that is not your meaning, please explain what any of this discussion has to do with Newtonian physics.

More to the point, please elaborate how the lack of a cause to initiate motion in geometric GR is corrected by considering spacetime to be curved? My whole point is that curvature alone, in the absence of a force, cannot initiate the motion of anything. If a test particle rests on the side of a hill, it will rest there forever unless a force acts on it. For example, if the hill is on Earth, gravity would act to make the test particle start rolling downhill. But in space, if there is no force of gravity but only curvature of spacetime, the initial 4−space path of the body is a straight line by definition of "at rest", and the body can never deviate from that straight line unless a force acts.

> [Schlyter]: Observations made in 3−space plus time, in a known
> reference frame, can be integrated into 4−spacetime and be used to
> validate or refute the theory.

Let's examine this claim too. Yes, 3−space potential and motion affect time, and can be used to convert GR's coordinate time into GR's proper time. 3−space itself remains isotropic around any source mass, and the slight radial contraction can be neglected for our purposes here as too small to matter. For example, for GPS satellites, length contraction is just a few millimeters. So what causes the satellites to orbit the Earth? Why should the fact that their on−board clocks have sped up relative to ground clocks cause them to move in a curve around Earth instead of continuing in a straight line? "Curved spacetime" means nothing more than that the clock rates have changed. It provides no explanation for deviation from simple, linear motion.

> [Schlyter]: What's this "deep reality physics" ?? A new buzzword you
> just invented?

It means physics that excludes magic or miracles for the simple reason that admitting them ends the search for understanding and predictability. Anything can be explained as a miracle, and the attempt to explain it can be dismissed because "we can't know the mind of God". Whether that is true or not, deep reality physics is tasked with explaining nature without miracles until such time as it finds something that cannot be explained in any other way. No such barrier to understanding and prediction has as yet appeared. By contrast, mathematical physics and philosophy are more concerned with descriptions of nature than with fundamental understanding, so they both regularly allow miracles. The term "deep reality physics" was coined to distinguish this type of physics from the other types. This contrast is most acute in the case of quantum mechanics, which has abandoned the principles of physics and consequently concluded "there is to deep reality to nature." Those unhappy with that conclusion have no other recourse but reverting to the principles of physics.

> [Schlyter]: Every model is btw based on some "magic": the fundamental

> assumptions which aren't proved but which are used to build the model.
> For some of these fundamental assumptions we can make the "magic"
> vanish by pointing to some other model − a model which may have its
> own set of "magic". But for the remaining assumptions we have no other
> model to point to, but merely choose our fundamental assumptions so
> they appear "reasonable".

If the "fundamental assumptions used to build the model" are the principles of physics, there is no magic involved because the opposite of each fundamental principle (such as creation from a true void) is a form of magic.

> [Schlyter]: Forces vs geometry can be viewed as such a choice. Your
> brain finds it impossible to accept geometry as the fundamental cause
> in GR − my brain finds it more acceptable. So it's perhaps just a
> matter of personal preferences?

Personal preferences are like choosing a favorite color or dessert. But cause and effect have existence in the objective reality we all experience, and not just in our minds. The goal of science is to develop tests to sort out the good and bad hypotheses. The good ones aid understanding and predictability. The bad ones are forever tacking on ad hoc helper hypotheses to accommodate new, unexpected observations (such as "dark energy" to explain the universe expansion accelerating instead of slowing through the action of gravity).

> [Schlyter]: By setting aside geometric GR we also set aside our
> understanding why gravitational and inertial masses are the same

See
http://metaresearch.org/cosmology/gravity/Does%20Gravity%20Have%20Inertia.asp
for a complete and highly intuitive explanation of why these are approximately equal without gravity being geometry in any meaningful sense.

> [Schlyter]: Classical celestial mechanics use Newtonian mechanics,
> with only small relativistic corrections in a few cases. This works
> well in the solar system and visual double stars, but fails in
> situations like a binary pulsar.

Modern celestial mechanics uses the GR equations of motion for all cases where relativity is relevant. Damour developed equations of motion specifically for analyzing the binary pulsar. As I said, GR would be untested without some such vehicle to predict motions in 3−space vs. time for comparison with observations made in 3−space plus time.

>> [tvf]: Gravity cannot be simply geometry because that provides no
>> source for new momentum.

> [Schlyter]: Does this mean you claim that geometric GR predicts that a

> collection of bodies initially at rest in space relative to one
> another and subjected to no other forces than their mutual gravity,
> that these bodies will remain at rest? As predicted by geometric GR of
> course. If not, and if geometric GR predicts the motions which
> actually are observed, in what way is geometric GR "falsified"?

Geometric GR describes only the gravitational potential field, and the potential by itself cannot cause anything to move through 3−space. Nor does it predict any curvature of 3−space. So an additional axiom or assumption is needed to get changes in motion. Both physical interpretations of GR (field and geometric) use the same axiom to get 3−space motions: that force is the gradient of potential. That allows them to derive 3−space equations of motion, without which GR would predict no accelerated 3−space motions of material bodies. A ball thrown into the air would not even slow down.

> [Schlyter]: If the gravitation potential changes instantly also over
> large distances, no matter whether the body is moved by gravitational
> or non−gravitational forces, then gravity does indeed propagate FTL as
> you claim.

I claim no such thing. Gravitational potential changes occur at speed c under any circumstances. There is no dispute about that.

> [Schlyter]: But if the gravitation changes instantly only when the
> body is moved by gravitational forces.

This furthers the same confusion. It is only the speed of those gravitational forces that exceeds the speed of light. So there is no need to bring in non−gravitational forces to make any points about how gravitational forces behave.

> [Schlyter]: Why do you consider geometry "magic" but not forces
> ("action at a distance")?

Geometry has no 3−space motion, no momentum, and therefore cannot be a source of new 3−space motion or momentum. A curve starting a ball rolling without a force acting on the ball would be magical. Action at a distance is also magical and forbidden in deep reality physics. I certainly have never advocated it.

Faster−than−light force carriers operating in forward time are the opposite of action at a distance. They carry momentum from a source mass to a target body at a finite speed. There is nothing magical about that.

>> [tvf]: If I show that a race car was at point x1 at time t1 and
>> reached point x2 at time t2, can't I conclude that the minimum speed
>> at which it traveled was (x2 − x1) / (t2 − t1)?

> [Schlyter]: I thought we were discussing GR, not NP..... rewrite those

> formulae using the field equations of geometric GR please..... <evil
> grin>

?? Space is Euclidean, even in geometric GR. Our coordinate
axes are Euclidean straight lines by construction, relative to which
light rays near masses bend. Speed is Lorentz invariant. So my example
is just as valid in a discussion of GR as it would have been if we were
talking about NP, which neither of us is doing here.

> [Schlyter]: True, phase changes can cause local explosions, even
> killing humans and destroying property. But was any of these
> explosions able to eject stones, or very big rocks, at Earth escape
> velocity (11 km/s) or larger? That what's required to make your EPH
> hypothesis produce asteroids.

Getting to speeds over 11 km/s is not a problem. Our
spacecraft do it whenever needed. Ejection speeds that high from impacts
are impossible because rocks don't have enough strength to remain
coherent in the face of that much energy absorbed in so little time.
Such rocks would vaporize.

However, in an EPH event, even if the shock wave travels at
twice that speed, it would take five minutes to travel Earth's radius.
Rocks, like rockets, are gently accelerated to escape speeds over
long−enough intervals that they have no difficulty remaining intact. And
any of the three explosion mechanisms is capable of producing enough
energy to explode or implode a Venus−sized planet.

> [Schlyter]: How old is this Le Sage model?

Mid−18th century. Rumors have it that Isaac Newton knew of
it too. It is so simple and natural that the ancient Greeks might have
thought of it.

> which many took to be a sign that the world would soon end, to finally
> convince astronomers and everyone else that rocks did fall from the
> sky.
> Yet compelling evidence for that had already been published a
> generation
> earlier.

> [Schlyter]: Science has to find a balance here. What would you favor
> yourself:
1. Accepting a theory which later turns out to be false, because that
theory had "compelling evidence" ??
2. Rejecting a theory which has "compelling evidence", a theory which
later turns out to be true, but at this point there's no hard evidence
for that theory.

Why must all theories be either accepted or rejected? My
position is that all viable, not−yet−falsified theories should be on the

scientific table for discussion and making distinguishing predictions. What would you prefer? First theory that catches on is always the winner? −|Tom|−

Tom Van Flandern − Washington, DC − see our web site on replacement astronomy research at http://metaresearch.org

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- ***References***:
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