

Re: Explain the Law of conservation of matter and energy

> > > > > context of the other conservation laws such a conservation of
> > > > > momentum.
> > > > > Basically conservation of energy is a tautological statement
> > > > > about
> > > > > a
> > > > > systems
> > > > > time symmetry.
> > > > >
> > > > > Bill, are you saying that the law of conservation of energy has
> > > > > no
> > > > > physical content?
> > > > >
> > > > > No – its physical content lies in the fact for a reason we do not
> > > > > understand
> > > > > yet all fundamental theories are expressible as a PLA or if you use
> > > > > QM
> > > > > as
> > > > > a
> > > > > starting point the existence of gauge transformations. That is the
> > > > > very
> > > > > important discovery of Noether which basically says symmetries in
> > > > > the
> > > > > lagrangian is the same as conservation laws and conversely. For
> > > > > example
> > > > > a
> > > > > mathematical analysis of EM shows it is based on gauge symmetry of
> > > > > its
> > > > > lagrangian. The theorem implies that is equivalent to a
> > > > > conservation
> > > > > law –
> > > > > in this case it is conservation of charge. Thus at rock bottom EM
> > > > > is
> > > > > a
> > > > > theory about charge conservation. I have a paper explaining all
> > > > > this
> > > > > if
> > > > > you
> > > > > post your email I can send it to you. It basically expands on the
> > > > > following:
> > > > > <http://www.colorado.edu/philosophy/vstenger/nothing.html>
> > > > >
> > > > > In the power point presentation in the link you gave it says:
> > > > > "Electromagnetic and nuclear forces are fictions introduced to
> > > > > preserve
> > > > > local gauge invariance." Do you agree with this claim of the
> > > > > fictitious
> > > > > nature of these forces?
> > > > >
> > > > > Yes – under the contextual meaning of fictitious here – which means it
> > > > > is
> > > > > logically equivalent to a symmetry. In saying EM forces for example

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> > > > result
> > > > from gauge symmetry what it is saying is that assuming gauge symmetry
> > > > results in EM forces – not that those forces do not actually exist.
> > > > This
> > > > view turns symmetry on its head – we do not say forces exist in
> > > > theories
> > > > that have this magical symmetry – we say this magical symmetry exists
> > > > hence
> > > > forces occur.
> > > > <http://www.upscale.utoronto.ca/GeneralInterest/DBailey/SubAtomic/Lectures/LectF13/Lect13.htm>
> > > > 'Requiring local U(1) gauge invariance requires that the particle
> > > > interact
> > > > with a field. In this case all of electromagnetism can be summed up by
> > > > saying there is a local U(1) gauge invariance of the universe.'
> > > >
> > > > > If so, how do you operationally define a force?
> > > >
> > > > The same as always.
> > > >
> > > > In classical physics and in SR, if a particle is undergoing inertial
> > > > motion (operationally verifiable state of motion) that particle is said
> > > > to have zero net forces acting on it. (Our frames of reference from
> > > > here on will be inertial.)
> > > >
> > > > From the definition of force.
> > > >
> > > > That is then the baseline for determining if
> > > > a "real force" acts on a particle:
> > > >
> > > > Not true. You adjective 'real' has changed everything. For example in
> > > > GR
> > > > fictitious forces appear in accelerated frames – no one denies that but
> > > > that
> > > > are not 'real' because they can be transformed away by going to another
> > > > coordinate state. One of the central lessons of GR is we only consider
> > > > what
> > > > is invariant. They are real in that they can be measured in that
> > > > coordinate
> > > > system – they are not real in that they are simply an artifact of that
> > > > coordinate system. The same with the force of EM – it real in that it
> > > > can
> > > > be measured. But it is not real in the sense it depends on something
> > > > more
> > > > fundamental – gauge symmetry. It all has to do with context.
> >
> > > I gave you the SR definition of force
>
> > Saying 'In classical physics and in SR, if a particle is undergoing inertial
> > motion (operationally verifiable state of motion) that particle is said to
> > have zero net forces acting on it. (Our frames of reference from here on
> > will be inertial.)' is not giving a definition of force.

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>
>> and I stipulated that the
>> reference frames would be inertial, which ruled out consideration of
>> GR.
>
> It was an example illustrating a principle.
>
>> But I can generalize the definition of non-zero force to deviation
>> from geodesic motion. But let's not go there yet. Let's stick with SR
>> and E&M.
>>
>>
>>>
>>> > If the particle is not undergoing
>>> > inertial motion, it is because it is being acted on by an unbalanced
>>> > "real force." This is the semantics of "real" —
>>>
>>> That is your definition of real – before foisting it onto the rest of us
>>> as
>>> gospel please obtain the agreement of physicists.
>>
>> We're talking ONLY about force in SR here.
>>
>
> I in fact did not stipulate the precise definition of force I was using.
>
>> Apparently to you there's no
>> such thing as force at all in modern physics.
>
> Only to people like you who seem to have difficulty in comprehension –
> namely of understanding context.
>
>> Do you even deny the
>> force concept in Newtonian mechanics?
>
> Of course not. But the fact you even ask such a question shows you have
> difficulty in understanding context. For the record I will state it again.
> When physicists say symmetry is fundamental and force is a consequence of
> that symmetry and not fundamental and hence not 'real' they do not deny the
> existence of force. If that does not fit in with how you semantically view
> the issue of 'real' – get over it. Your carry on about it reminds me of a
> guy I knew who objected to the name of 3rd normal form in database theory –
> he disliked the name normal – how can data be 'normal' he said. The
> lecturer told him then and I tell you now – either accept the standard use
> of words or give it away.
>
>>
>>> Until then it is simply
>>> your semantics just like my discussion on real above is my semantics. I
>>> however suggest my usage is much closer to how physicists use the term
>>> than

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>>> you do ie for the idea there is an objective reality intendment of
>>> 'coordinate' systems.
>>>
>>> > derived operationally
>>> > --- in classical physics and in SR. Now, since an electromagnetic field
>>> > is capable of putting a charged particle in non-inertial motion, by
>>> > definition that is because in SR the particle is acted upon by a "real
>>> > force." Thus, the electromagnetic force is "real" in this context. I
>>> > know this is just a semantic issue,
>>>
>>> Correct – which is why it is irrelevant to the physics – but vital to
>>> understanding what is written. When physicists say that forces are not
>>> 'real' and symmetries are it is a point of view they are taking. You may
>>> not like the way they use words like real to express that viewpoint – but
>>> once you understand what is meant by it then the evidence is it is true.
>>
>> If an accelerometer reads nonzero when attached to a mass body, is that
>> body experiencing an external force or not?
>
> No eg an accelerometer held in your hand will register yet it has no net
> force – but the issue is quite subtle (even though it is experiencing no net
> force it is still experiencing the force of gravity) and the converse is not
> true either – eg in dropping an accelerometer it experiences a force and yet
> gives no reading.
> <http://www.lunar.org/docs/LUNARclips/v5/v5n1/Accelerometers.html>
>
>> I prefer operational
>> definitions of terms in physical theories, especially of measurables,
>> whenever possible.
>
> What you prefer is irrelevant. In physics (in all subjects actually) words
> have meaning dependant on context. If that context does not suit your
> preconceptions then if you wish to make progress in understanding physics
> get rid of your preconceptions. Your posts so far suggest that is something
> you do not wish to do eg the discussion you had on covariance indicated you
> thought it meant invariance – it means form invariance – invariance is
> something else again. That is what I mean by context – putting invariance
> after form gives it an entirely different meaning.
>
>>
>>>
>>> > but a theory requires a consistent meaning to its jargon.
>>>
>>> Sure.
>>
>> You say 'sure' at this point, but you contradict yourself later on.
>
> No I don't. You confuse consistency with different meanings dependant on
> context. Does normal in 3rd normal form mean average? No it does not.
> Does that make its use in database theory inconsistent – of course not. And
> if one uses normal in a sentence meaning average in one case and normal in

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> the sense of normal form in another can people figure out what it means from
> context? – usually – especially if the person that wrote it knew what they
> each meant. And what would people think of someone who said such was
> inconsistent? I suspect you know the answer without me spelling it out.
>
>>
>>> But rather than you decide the meaning of that jargon glean it by
>>> reading what physicists say and understanding its context. And if that
>>> fails do a post asking for clarification – not asserting This is the
>>> semantics of "real".
>>>
>>>> In one theory a force can't be both real and
>>>> fictitious (nonreal) at the same time.
>>>
>>> It can depending on context.
>>
>> I guess that about sums up your philosophy of semantics in physical
>> theories.
>
> It sums up what is generally assumed in the study of any subject. Words
> have meaning depending on context. And if you do not like the way words are
> generally used in physics then I suspect you will get nowhere fast.

I have nothing against the word "force." I also have no problem with a given word being defined differently in different theories in physics. However, in a single physical theory, a given jargon word should have precisely ONE meaning. What you are doing is to conflate two very different theories and thereby creating an ambiguity of what "force" means in both theories. In SR, EM fields are force laden. In some other theory, perhaps, they aren't, but one can't conflate these two theories (or any two different theories). One of the hallmarks of a good theory is that it has a nonambiguous dictionary of jargon.

We've seen this before: Hertz invented a theory of mechanics that had no force concept in it (so I've been told, i.e., Principles of Mechanics). His mechanics was not merely Newtonian mechanics in a "different context"; it was a different theory altogether, by definition.

For example: in GR, gravity is NOT a force. Period. There is no "context" in GR in which gravity is a force. Any theory that holds gravity as a force is a different theory from GR.

So, can a jargon term in physics have a meaning that depends on "context"? Sure! If that distinction in context is given by different theories. It's the theory that defines the context. That way, Bill, you can have your cake and eat it too.

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- **Follow-Ups:**

- ◆ **Re: Explain the Law of conservation of matter and energy**
◇ From: Autymn D. C.
- ◆ **Re: Explain the Law of conservation of matter and energy**
◇ From: Bill Hobba

- **References:**

- ◆ **Re: Explain the Law of conservation of matter and energy**
◇ From: Bill Hobba
- ◆ **Re: Explain the Law of conservation of matter and energy**
◇ From: surrealistic-dream
- ◆ **Re: Explain the Law of conservation of matter and energy**
◇ From: Bill Hobba

- Prev by Date: **Re: Hobba's misconceptions**
- Next by Date: **Re: 100 Years**
- Previous by thread: **Re: Explain the Law of conservation of matter and energy**
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