Re: variation of appropriate degrees of freedom of metric

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- *From*: "Ken S. Tucker" <dynamics@xxxxxxxxxxxx>
- *Date*: Fri, 15 Feb 2008 09:35:58 −0800 (PST)

On Feb 13, 12:23 pm, babalu...@xxxxxxxxx wrote:

> In Carroll's text

Provide a link.

> Einestein's equations are obtained from varying the
> Hilbert action with respect to the full degrees of freedom of the
> metric, i.e. the metric variation is not restricted to preserving
> constant signature.

What's a "signature" ?

> Assuming that constant signature underlies the
> Bianchi identity, requiring that the energy−momentum tensor be
> conserved preserves the Bianchi identity in the final result and maybe
> saves us from having to vary with respect to the appropriate degrees
> of freedom of the metric. I would like to know if the above thoughts
> are correct.

IMHO: It depends on the "domain of
applicability" that is intended.
For pragmatic reasons specialized
simplifications can be done.
However, doing so will likely make the
interface of GR and Wave−Mechanics
impossible.
((That might be a question better posted
in sci.phy.research where expert math
physicist's could be more clarifying)).

Turning the problem inside−out, I'm in
favor of harmonic solutions, since all

physical measurement requires the use
of EMR frequency's, to survey effects
of gravitational fields.

> Particularly, if I try to explore what happens if the matter term in
> the
> action is ignored and vary with the full (inappropriate) degrees of
> freedom of
> the metric, I obtain solutions that violate the Bianchi identity.
> Imagine a
> boundary condition on G_mu_nu such that it is non−zero in some regions
> of a
> spacelike hypersurface then the equation resulting from this
> variation: G_mu_nu=0 outside the boundary would mean the G is not
> conserved. This violation seems to me more a result of varying with
> respect to inappropriate degrees of freedom of metric than of ignoring
> the matter term in the action.
> Is this correct?

Let me express AE's Law simply by
G=T
and it's covariant derivative as
(G=T);w =0.

Focus a bit on T;w=0.
Look carefully at that and see how
energy is exchanged via quanta, (not
continuously).
The differential variation of a quantum
increment is zero, we can prove that.
Take the derivative of the following
series, assuming h is a constant,

T = h + h + h......

dT = 0, but T is NOT a constant.

> Thank you for any guidance on this.

Thank you for clarifying a question.
I'm intersted in the 5th rank Bianchi's
too.
Regards
Ken S.Tucker
PS Nice post.
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