Re: How real are the "Virtual" partticles?

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From: Eugene Stefanovich (*eugenev_at_synopsys.com*)
Date: 03/16/05

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Arnold Neumaier wrote:
> Eugene Stefanovich wrote:
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>>Igor Khavkine wrote:
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>>
>>>There is absolutely no relation between bare particles and what are
>>>called "virtual particles". The latter are simply not particles, they
>>>are squiggles on paper.
>>
>>There is a relation. When you draw a real electron in QED you first draw
>>a line corresponding to a "bare" electron. Then you add lines of virtual
>>photons that begin and end on the bare line. Then you add small
>>virtual electron−positron loops to the virtual photon lines, etc.
>>So, loosely speeking, in QED real electron = bare electron + coat of
>>virtual particles.
>
>
> Not 'in QED' but only 'in standard perturbative QED'.
> One can do QED in many ways, and depending on how it is done,
> what is virtual is very different. In NRQED, which is the version
> of QED used for high agguracy calculations of the Lamb shift
> (and hence responsible for the supreme trust in QED),
> there are no virtual particles at all.
>

How can it be so? From what I read about NRQED, its Hamiltonian
contains trilinear terms, like a^+c^+a. This means that if you
prepare a state of one electron a^+|0> at time=0, then after a
short time, this state will evolve into exp(iHt)a^+|0> which
is an infinite linear combination of multiparticle states.
That's what I call dressing by a coat of virtual particles.
That's what I find unphysical in all QFT theories which are
not presented in the dressed particle form.
Of course, this problem can be remedied by a unitary transform
to dressed particles or by a (equivalent) unitary transformation of
the Hamiltonian. But I haven't seen if anybody have done that for

NRQED.

Eugene Stefanovich.