Dark Matter, Dark Energy, and Light-Vacuum Interactions.

The existence of dark matter and dark energy remain to be two of the most intriguing enigmas of the contemporary physics.
A large volume of specialized, as well as popular literature has been written on the topic.
In particular, Lee Smolin states in his book "The Troubles With Physics" that there are only two explanations for the two facts, namely:
1. Stars in galaxies spin faster than they should based on the visible amount of matter in the galaxies;
2. The universe expands faster than it should (i.e. accelerates instead of decelerating) based on the visible amount of matter in the universe;
which are:
1. The Einstein's Theory of General Relativity is wrong;
or
2. Dark matter and dark energy exist.
However, there is the third option, based on the fact that everything we know about distant galaxies is based on the "visible amount of matter" – the key word is "*visible*" (in the general meaning of the term – it includes *all* possible types of the registered radiation). What if the problem is not with WHAT we see, but with HOW we see it?
All astronomical observations are based on two hidden assumptions subconsciously accepted by every astronomer ("the ideal picture of the cosmos"):
1. The vacuum is an empty space;
2. The light travels at "the speed of light" of 299,792,458 m/s.
However, nowadays everyone knows that those assumptions are generally wrong.
1. The vacuum is not an empty space, it is filled with virtual particles which affect actual particles/objects (e.g. the Casimir Effect).
2. When light travels through a medium the interactions between the medium and the light lead to the decrease in its speed (even up to zero).

Since the vacuum is also a medium, interactions between the vacuum and light have to affect the speed of light.

That essentially *quantum* effect may be very small, but when light travels thousands or billions of light years it may lead to *significant* deviations from "the ideal picture of the cosmos".
For example, due to the light-vacuum scattering our astronomers may see only a part of the light initially emitted by the stars in other galaxies, hence, the "dark matter".
Similarly, calculations of the locations of the distant galaxies, which ignore the vacuum-light slowing down, may simply lead to wrong results, such as the "dark energy".

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