# A 2nd note on anisotropic quantum gravity

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**Abstract**

In a previous paper, we introduced a model that accounts for both dark matter and dark energy. In this paper we will attempt to refute objections to the model.

## 1 On cold dark matter from a graviton condensate

One objection to the model introduced in [1] is that dark matter must be *cold*. In other words: the dark matter must have a speed much less than the speed of light in vacuum.

We assume that a lone graviton propagates at the speed of light. That is, without being *relayed*, the graviton travels at the speed of light.

Gravitons at the very least undergo Shapiro delay in vacuum – a graviton in the presence of other gravitons travels with a speed less than the speed of light, because of relaying. The speed of the graviton can only be further slowed down when travelling through a mass. This model is experimentally verifiable. There will be no gravitational shadow behind a mass, but there will be a lag – the gravitons travel slower than the speed of light while being relayed by a mass.

Finally, it should be noted that as the spatial dimension of the gravitational field runs from 3 down to 2 down to 1, the slower the gravitons will travel. The slower the gravitons, the colder the dark matter. This is because of the increase in graviton-graviton interaction (e.g. gravitons relaying other gravitons). So basically, the more that one compacts the gravitational field, the *colder* the graviton condensate becomes. This is the opposite of a gas of atoms or molecules, which when compressed becomes hotter (e.g. ideal gas law).

## 2 On Loop Quantum Gravity

One objection is that the model is not compatible with Loop Quantum Gravity [2].

The model shows that there is a tetrahedral substratum underlying the 4 known interactions. The only difference is that this model predicts that these tetrahedra will not be as tiny as the Planck scale, making them all that much easier to experimentally verify.

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# 3 On oblate and prolate galactic halos

One objection is that the galactic halos are always spherical. See page 757 in [3] for a discussion of oblate and prolate halos.

# References


[1] Halayka. A note on anisotropic quantum gravity.
TechRxiv. Preprint – https://doi.org/10.36227/techrxiv.20326470.v5

[2] Ashtekar. Introduction to Loop Quantum Gravity.
arXiv. Preprint – https://doi.org/10.48550/arXiv.1201.4598

[3] Binney et al. Galactic Dynamics. Second Edition.