Dear Dr. Wen,

The above manuscript has been reviewed by one of our referees.

The resulting report includes a critique which is sufficiently adverse that we cannot accept your paper on the basis of material now at hand. We enclose pertinent comments.

If you feel that you can overcome or refute the criticism, you may resubmit to Physical Review Letters. With any resubmittal, please include a summary of changes made and a brief response to all recommendations and criticisms.

Yours sincerely,

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Report of Referee A -- LS10228/Gu
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This paper claims to have constructed a bosonic lattice theory which has as its low energy excitations only spin 2 modes. Furthermore, the equation of motion of these modes is shown to reproduce linearized Einstein gravity and as such the authors claim to have constructed a lattice model of quantum gravity.

As far as I can see it their philosophy is to start from a model built from two index valued lattice fields which generically would possess low energy excitations corresponding to spin 0, 1 and 2 fields. They then choose carefully the dynamics in such a way that the spin 0 and 1 excitations are lifted to high mass leaving only
helicity 2 fields as massless. Furthermore, they then find that the latter modes satisfy the linearised equations of GR.

However, key points of their argument are missing; they do not give any real argument as to how strong fluctuations of the spin 0 and spin 1 modes lead to the appearance of a mass gap or indeed how a gauge invariance subsequently appears. A reference is made to an example of an emergent U(1) gauge theory but even in this case no real calculations are made to support this claim. If this paper is to be taken seriously an effort should be made to support these central claims. Even if this basic result can be demonstrated the claim that this is a quantum theory of gravity is much too strong. As far as I see it they have at most shown that the classical low energy limit of this theory is linearized GR. But their model does not get the nonlinear terms in the Einstein action right and will presumably break down at energies on the scale of the massgap. For a genuine quantum of gravity the behavior of the theory at high energies must also be under control which is not shown here. The fact that they have a lattice theory is not enough - eventually one would like to understand how to model the high energy behavior by some sort of continuum theory at which point divergences will generically arise.

For these reasons I cannot recommend publication of this paper in PRL in the present form. I believe a substantial rewriting of the paper is minimally required to address these concerns.