Review of: "Quaternionic Bekenstein-Sanders Guage Fields for TeVeS"

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Potential competing interests: No potential competing interests to declare.

This paper considers the Bekenstein-Sanders Gauge field for TeVeS theory, which for some reason is conventionally gauge fixed as B^mu B_mu = - 1. By looking at this gauge fixing condition it seems clear that if the gauge group is abelian, then this gauge fixing condition breaks that abelian gauge symmetry completely. From this the authors conclude that the gauge group must be nonabelian. But that conclusion seems incorrect, since what is wrong with having a gauge fixing condition that fully breaks the gauge symmetry? So the starting point of this paper is either wrong, or not very well-explained. We need much more elaboration about this point to draw the conclusion that this gauge field must be nonabelian. What regards the computations, they maybe could be correct. Computations look pretty nice, they could perhaps have some value on their own as some sort of exercise in partial gauge fixing. With a quatarnionic gauge group and a quaternionic imaginary gauge field, the gauge fixing condition B^mu B_mu = - 1 does not fully break the gauge symmetry, but there is some residual gauge symmetry remaining. I have no complaints on this conclusion. But what can we use this observation for? This paper appears to leave that question pretty much unanswered, although there is a speculation that a quaternionic gauge group would correspond to quaternionic quantum mechanics, but this connection seems also not very clear since what prevents one from taking any gauge group and treat the object that the authors associate to as the Schrodinger wave function as instead a quantum field that can be in any representation of that gauge group? This paper appears to raise more questions than it answers.