Review of: "Electron Spin Topology in Excited States and Fractional Spin Effect"

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Potential competing interests: No potential competing interests to declare.

The authors argue that spin is not an abstract two-valued property of the electron particle but a property of the electron wave that can be fully described by its momentum and current densities. The idea rely on the definition of momentum and current densities in Eq. (2). However, the discussion about novelty of the mathematical definition is insufficient, as can be seen from small number of references, considering that electron spin is widely studied in spintronics.

The authors claim that currents intrinsically include spin in the first term of current in Eq. (2). However, this term is very similar to Ampere relation of current and magnetization

$$j = \nabla \times m$$

which is a current associated to orbiting movement of the electron, i.e., its orbital angular momentum. Do the authors assume that the spin and orbital magnetization is one and the same? The authors should clarify it, because spin and orbital angular momentum are different quantities and separable in Dirac equation, even though spin-orbit coupling is intrinsically included in the equation.