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Dark matter or ”dark matter”?

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In the theory of relativity, the notion of a particle is based on the irreducible representation of the Poincaré group. However, there are post-relativistic theories which generalize the relativistic notions, including that of a particle. One such theory is the theory of superfluid vacuum, which describes the physical vacuum as a Euclidean 3D superfluid; whereas Lorentzian 4D spacetime and symmetry are phenomena induced by superflow. This theory views relativistic particles as small fluctuations of the background superfluid, but the superfluid itself is a kind of quantum nonlocal matter, which cannot be regarded as consisting of particles defined in the relativistic sense. Therefore, it cannot be observed by conventional particle detectors, or Michelson-Morley-type tests; instead it manifests itself as 4D curved spacetime and other long-range fields of integer spin. To test the theory's predictions on a galactic scale, we derive the gravitational potential within the weak-gravity limit and apply best-fitting procedures to the rotation curve data obtained from fifteen galaxies by the HI Nearby Galaxy Survey; assuming their stellar disk's parameters to be fixed to the mean values measured using photometric methods. The fitting results correspond closely with observational data, even for those galaxies whose rotation velocity profiles do not have flat regions.

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