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Evidence for Pions and Kaons Being Spin-0 Vector Particles

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Experiments conducted in the late 1950s and early 1960s provided compelling evidence that pions and kaons possess directional properties, challenging their traditional classification as pseudoscalar particles. In particular, four of these experiments, performed by four distinct research groups, each reported deviations exceeding five standard deviations from the expected result for pseudoscalar pions. During the 1950s and 1960s, the scientific doctrine associated vector particles with spin-1 characteristics, inadvertently sidelining the pi-mu asymmetry observations due to the established spin-0 nature of pions. Recently, it has been shown that a spin-0 particle can indeed be a vector [1]. Thus, we are proposing new pion experiments based on the spin-0 vector pion theory. Unlike earlier studies that determined only one value, these experiments will determine how the muon distribution changes with the variation of a parameter. Specifically, by varying the angle between the pion's polarization vector and its momentum vector using a magnetic field (which does not affect the polarization direction due to the pion's zero spin and zero magnetic moment), one measures the variation of the muon distribution with pion angle. (Those earlier experiments indicated a muon distribution peaked in the backward direction relative to the direction of the proton beam that created the pions.) This method, coupled with the investigation into the directional properties of kaons, specifically through the decay process K+ -> mu+ + neutrino, promises to shed new light on the vectorial nature of these particles.

[1] W. A. Perkins, "Massive vector particles with spin zero," EPL (Europhysics Letters) 114 (2016) 41002.

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