Simultaneous Formation of Electric and Magnetic Photon States by Electroweak Symmetry Breaking

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Z. Naturforsch. **59a,** 185 – 195 (2004); received December 16, 2003

In order to describe the electromagnetic effects (fields) of simultaneously occurring electric and (hypothetical fermionic) magnetic monopoles, Cabibbo and Ferrari introduced in addition to the conventional electric vector potential a magnetic vector potential, thus leading to electric and magnetic photons. A theoretical confirmation (and justification) of this phenomenological ansatz is provided by the manifold of photon states in de Broglie's theory of fusion. Lochak showed that in this theory either electric or magnetic photon states can be derived. To study the possibility of the simultaneous existence of electric and magnetic photon states a modern version of de Broglie's fusion theory is used, which is formulated by means of generalized de Broglie-Bargmann-Wigner equations. It is demonstrated that the corresponding photon equations admit the simultaneous existence of electric and magnetic photon states if the electroweak SU(2)- and CP-symmetry breakings are introduced into these equations. The latter symmetry violations induce violations of the permutation symmetry, which is crucial for the proof of Cabibbo's and Ferrari's hypothesis referred to photons with partonic substructure.

Key words: Electric and Magnetic Photons; Magnetic Monopoles; Relativistic Two-Body Equations; Parastatistics.