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#### A 4 On CP-Parity Violations

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Symmetry has always been appreciated. An ancient example: Gods live on Earth, and therefore Earth has to have the most perfect shape — a sphere. A modern example: After CPT invariance<sup>1)</sup> had been demonstrated, it was commonly believed that Nature was invariant under C, P and T transformations. When P-parity had been found to be violated<sup>2)</sup>, CP-invariance<sup>3)</sup> was left to save the symmetry. When the decay of a long-lived kaon into two pions ( $K_L^0 \rightarrow 2\pi$ ) had been observed<sup>4)</sup>, the question of CP-violating interaction arose. Many interactions have been proposed<sup>5)</sup> and many experiments performed to ascertain the appropriate one.

We decided to look for vector meson decays into photon and electron-positron pairs<sup>6)</sup>. This process could test the noninvariance of the electromagnetic interaction under charge conjugation<sup>5)</sup>. The vector meson namely, cannot decay into two photons<sup>7)</sup>, and one of them being virtual, the process is forbidden by invariance under charge conjugation. The estimated partial width for  $\omega \rightarrow \gamma e^+ e^-$  is about 4 eV, and the total width about 11 MeV.

A number of indirect tests of CP violations have been proposed. Neutron polarization according to the electron-positron plane in

$$\pi^- + p \rightarrow n + e^+ + e^-$$

was estimated<sup>8)</sup> up to 1%. A similar process

$$K^- + p \rightarrow \Lambda + e^+ + e^-$$

could give more asymmetry. Yet, this process can have real (on-mass-shell) intermediate states ( $\Sigma\pi$ , e. g.). They contribute to the imaginary part of the matrix element, producing the asymmetry of  $\Lambda$ 's according to the electron-positron plane<sup>9)</sup>.

The present experimental situation does not yet permit determination of the appropriate CP-violating interaction. Moreover, the experimental data does not contradict even CP-invariant models<sup>10)</sup>.

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