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INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

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W E A K I N T E R A C T I O N S

26 - 29 June 1973

(SUMMARIES)

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International Atomic Energy Agency

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WEAK EFFECTS IN e^+-e^- COLLIDING BEAM REACTIONS

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After all the recent work on unified models for weak and electromagnetic interactions, it is instructive to carry out a general study of the possible weak effects that may become measurable with storage rings of the next and future generations. We proceed as follows. We first abstract those features suggested by the different models and carry out a phenomenological discussion of the observable consequences. Whenever possible, we then specialize to the various models and make comparisons.

General new features are: possible neutral spin-one boson, with vector and/or axial coupling; possible neutral spin-zero boson, with both scalar and pseudoscalar couplings; heavy leptons; possible breaking of the chiral rules of the massless limit (i.e. for m_e , $m_\mu \to 0$) ; possible breaking of e-μ symmetry; electromagnetic properties of W bosons; general high-energy behaviour.

We discuss: general tests of symmetries; effects from spin-one and spin-zero weak exchanges in one-particle inclusive annihilation and in $\mu^+-\mu^-$ annihilation, both from polarized and unpolarized beams; comparison with 2γ virtual effects and bremsstrahlung effects; radiative corrections for polarized and unpolarized beams; longitudinal polarization effects for produced particles; comparison with bounds from muon g-2; higher energy weak processes; test from electron-electron and/or electron-positron scattering; tests of chiral behaviour; limitations from the deep inelastic electroproduction; tests of μ-e symmetry.

Systematic comparison is carried out, in particular with the Weinberg-Salam, Lee-Prentki-Zumino and Georgi-Glashow models and similar models listed by Bjorken and Llewellyn-Smith.