40 Years AGO

CERN-TH-3892/84

NEUTRINO AND MUON PHYSICS IN THE COLLIDER MODE OF FUTURE ACCELERATORS*)

A. De Rújula and R. Rückl

CERN - Geneva

A B S T R A C T

Extracted beams and fixed target facilities at future colliders (the SSC and the LHC) may be (respectively) impaired by economic and "ecological" considerations. Neutrino and muon physics in the multi-TeV range would appear not to be an option for these machines. We partially reverse this conclusion by estimating the characteristics of the "prompt" ν_μ, ν_e, ν_τ and μ beams necessarily produced (for free) at the pp or $\bar{p}p$ intersections. The neutrino beams from a high luminosity (pp) collider are not much less intense than the neutrino beam from the collider's dump, but require no muon shielding. The muon beams from the same intersections are intense and energetic enough to study μp and μN interactions with considerable statistics and a Q^2 coverage well beyond the presently available one. The physics program allowed by these lepton beams is a strong advocate of machines with the highest possible luminosity: pp (not $\bar{p}p$) colliders.

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

CERN-TH 6452
IFAE-92/001

Neutrino Fluxes at Future Hadron Colliders

A. De Rújula[1], E. Fernández[2] and J.J. Gómez-Cadenas[1]

[1] *CERN-CH-1211 Geneva 23, Switzerland*
[2] *Institut de Física d'Altes Energies*
08193 Bellaterra, Barcelona, Spain

Abstract

We study the neutrino fluxes produced by the decay of low momentum transfer charmed and beautiful particles in beam-beam and fixed-target collisions at LHC and SSC energies. To study the total production cross-sections and longitudinal momentum distribution of those particles, we use a non-perturbative QCD approach, the Quark Gluon String Model. The transverse momentum distributions are computed by extrapolation of existing data with an empirical formula based on Hagedorn's thermodynamical model. We discuss various set-ups to detect and exploit these neutrinos at the LHC. We find that in a relatively small target located directly downstream of the interaction point, at about 100 metres distance, a few thousand ν_τ interactions per year, at the current design luminosity of the LHC, could be observed. The number of ν_e and ν_μ interactions will be a factor of 10 higher. This demonstrates the possibility of a high energy neutrino physics program at the LHC (and possibly also at the SSC) that would include a direct observation of the yet unseen tau neutrino.

CERN-TH 6452
IFAE-92/001
April 1992

SND Today: thanks Alvaro and Happy Birthday !