Proposals on Beam–Dump Utilization for Linear Collider

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OUTLINE

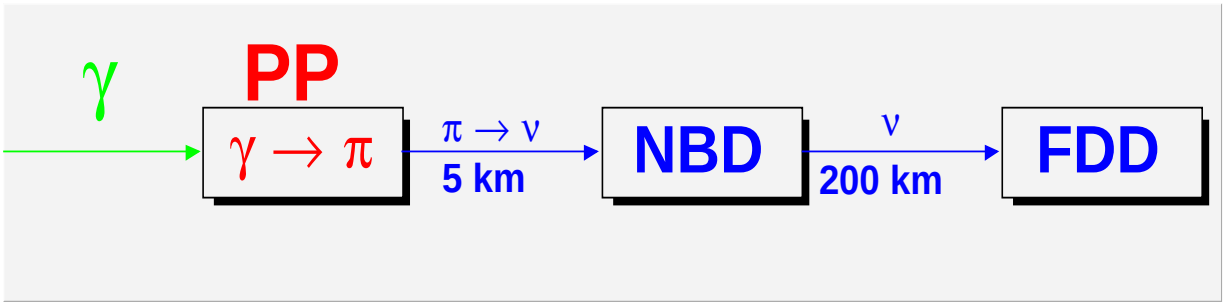
How to work with beam dump?
Standard approach: *destruction.*
Proposal: $\Rightarrow$ *utilization for technics and physics.*

I. Initiation of an accelerator–driven sub–critical reactor

The idea to work with sub–critical nuclear reactor, initiated by proton or electron beam, for foolproof production of energy and (or) cleaning of nuclear pollution is well known (Rubbia). Here proton or electron beam with particle energy of about 1 GeV is suggested to produce neutrons in the cascades within body of reactor. The problem here is in obtaining necessary beam power of about 5 MW or larger.

For definiteness, in TESLA project we expect mean used beam power about 11 MW with electrons or (and) photons having energies of about hundreds GeV. In the suitable target this particle energy can be transmitted to low energy particles to initiate fission process in reactor.

II. Neutrino factory



A. Pion producer (PP) – water cylinder of length about 20 cm (*radiation length*). Here electrons produce photons via bremsstrahlung, and than these photons (or direct photons) produce pions via $\gamma N \to \pi\pi\pi...N$

B. Neutrino transformer (NT) – low vacuum pipe of length 1–5 km and radius about 2m for $\pi \to \mu\nu$ decay with $0.6 \cdot 10^{11}$ ν/s and angular spread $2 \div 0.4$ mrad. $1 \div 2$ events $\nu_\mu N \to \mu X$

C. Nearby detector (NBD) at 1.1-10km after NT – for estimates: water of length 100m with radius 2-10 m. – $1 \div 100$ events $\nu_\mu \to \mu X$/sec

D. Far distance detector (FDD) at the distance $L = 100 \div 200$ km: water of length 1 km with radius about 40 m with $\sim 100 \div 1000$ events $\nu_\tau N \to \tau X$/year from $\nu_\mu \to \nu_\tau$ oscillations (twice larger than background).

• To increase number of oscillation events by a factor about 200 one can use for FDD the Ice-cub detector with volume 1 km^3. In this case before PP one should turn electron beam to large angle keeping angular spread but with loss of monochromaticity.