A new-concept calorimeter for future neutrino beams based on Kaon tagging

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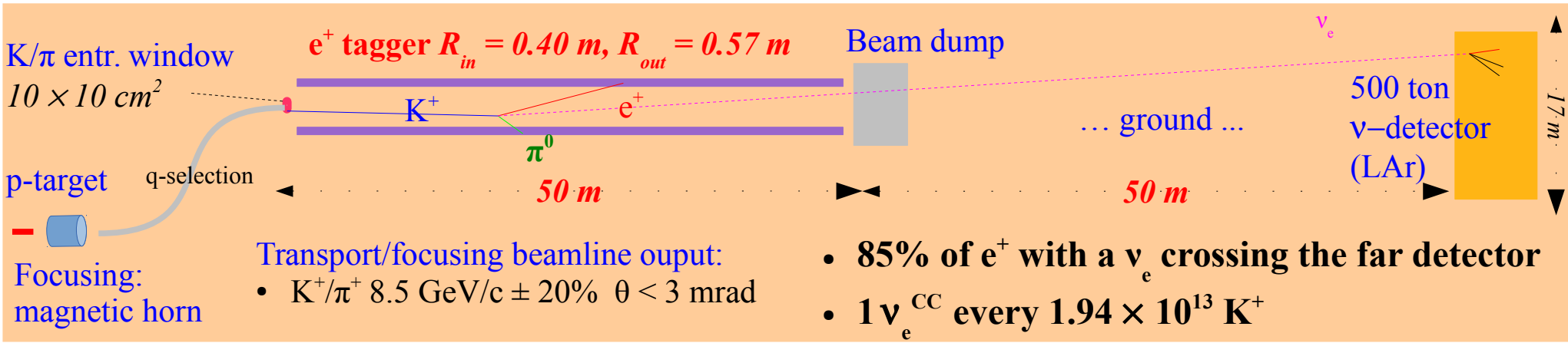
- **Knowing the ν_e cross section is crucial for Leptonic CP violation** (modulations of ν_e from $\nu_\mu \rightarrow \nu_e$)
- Present measurements w. **conventional ν beams limited by syst. in the flux** (~10% norm. error)

→ A new-generation ν source based on tagging of e^+ from K_{e3} decays $K^+ \rightarrow e^+ \pi^0 \nu_e$



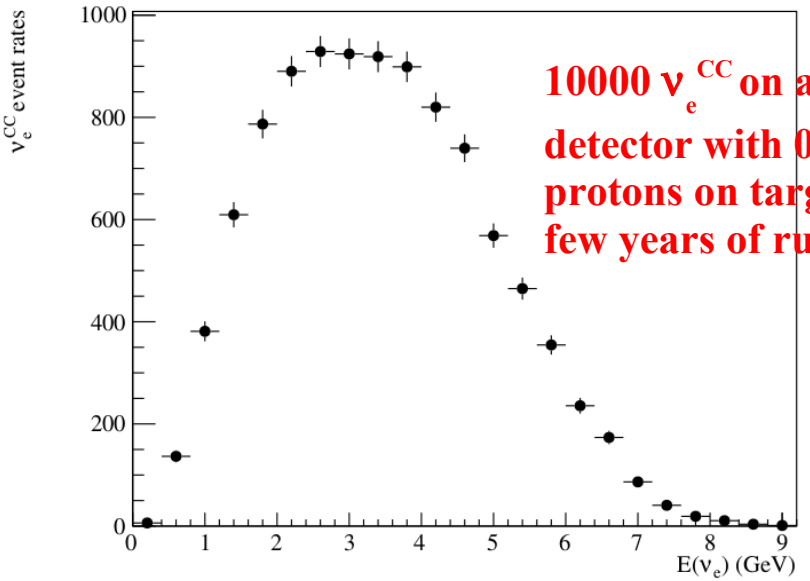
Transport/focusing beamline ouput:
- K^+/π^+ 8.5 GeV/c ± 20% θ < 3 mrad

- **85% of e^+ with a ν_e crossing the far detector**
- **1 ν_e^{CC} every 1.94×10^{13} K^+**

ν_e flux proportional to the e^+ rate in the tagger

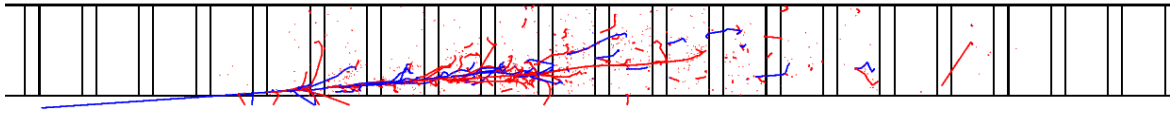
ν_e flux will NOT depend on hadro-production, K/π production ratio, Protons on Target (PoT), 2ry beamline efficiency **but only on:** the **geometrical acceptance** of the e^+-tagger/ν-detector, the **e^+ tagger efficiency** and the **mastering of residual backgrounds. O(1%) systematic error achievable**

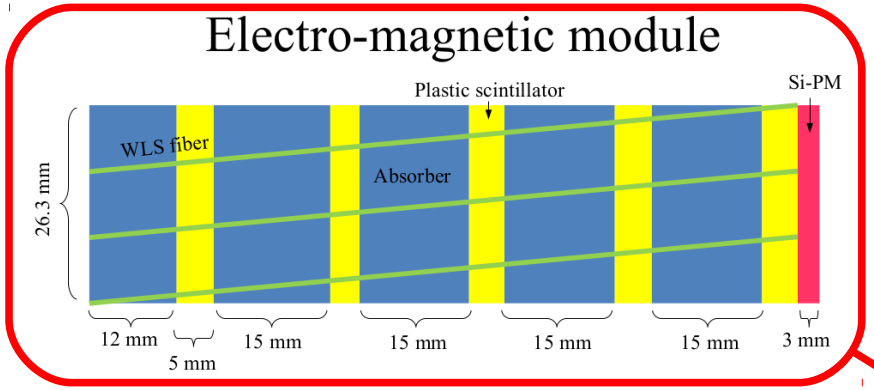
→ ν_e^{CC} precision measurement

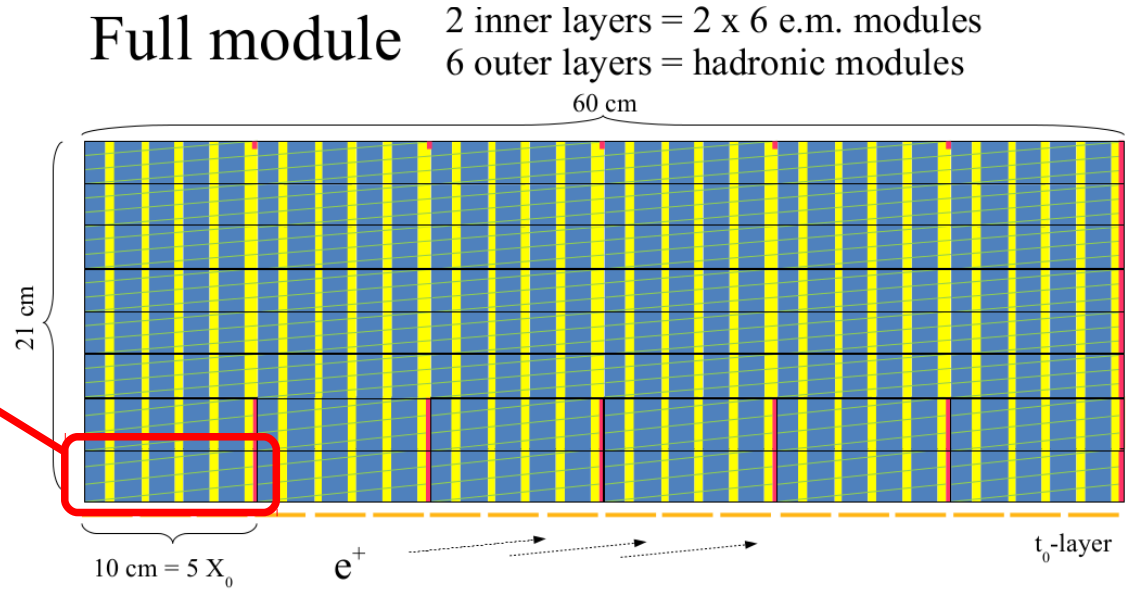


10000 ν_e^{CC} on a 500 t detector with 0.5-5 10^{20} protons on target (~ few years of run)

Proposed technology: Shashlik calorimeter (0.5 cm scintillator tiles + 1.5 cm Copper slabs) **W**ave **L**ength **S**hifting **fibers** running along the average e^+ direction (i.e. almost perpendicular to the tiles) with ~1 cm pitch, read-out by small area **Si**licon **P**hoto-**M**ultipliers

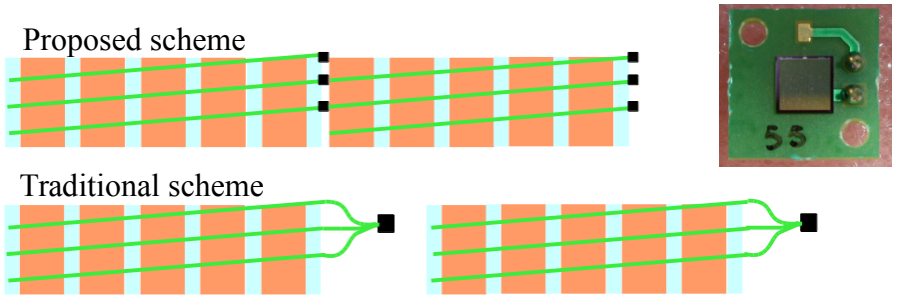






Radial views (the 2π geometry is obtained with 76 azimuthal modules)

1 Si-PM per fiber, avoid bundling to improve the longitudinal sampling uniformity



- **Full GEANT4 simulation** in progress.
- **test-beam with π/e beams** planned for e.m. module.
- A **3 m long demonstrator** (**ENUBET**, **E**nhanced **N**e**U**trino **BE**ams with kaon **T**agging) possibly at the **CERN ν platform** is envisaged.
- A **working group** is forming. Open to interested parties!