

Pion cross-sections from HARP-CDP or from the HARP Collaboration?

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The HARP experiment at CERN was to provide inclusive cross-sections of the production of ρ , π^+ and π^- , by p , π^+ and π^- beams with momenta ranging from 1.5 and 15 GeV/c, on target nuclei ranging from hydrogen to lead.

A central goal for HARP were precise cross-sections of π^+ and π^- production on heavy nuclei, input for the optimization of the proton driver of a neutrino factory.

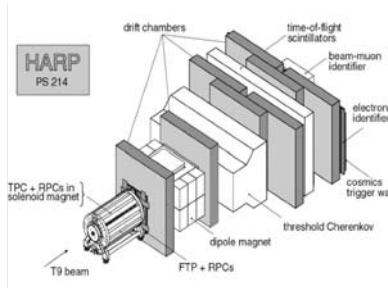
The HARP-CDP group published the inclusive cross-sections of ρ , π^+ and π^- production on Be, on Cu, and – with a view to the neutrino factory – on Ta nuclei (Refs. [3 – 6]).

The HARP Collaboration analyzed the very same data and published cross-sections (Refs. [7–10]) that are grossly different, and that disagree also with results from the E802 (Ref. [11]) and E910 (Ref. [12]) experiments.

The prime origin of the disagreement is understood: a bias in the reconstruction of track momenta of $\Delta(1/p_T) = 0.3$ (GeV/c) $^{-1}$, caused by the HARP Collaboration's lack of understanding of TPC track distortions and RPC timing signals (see the controversy apparent in Refs. [13–16]).

Our conclusion that analysis techniques and cross-sections from the HARP Collaboration are seriously flawed, is supported by two Review Committees (Refs. [17–19]).

The HARP detector and its performance



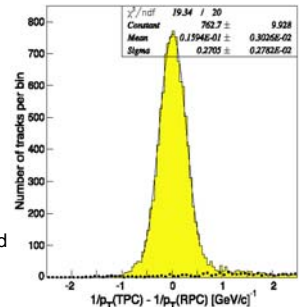
TPC

- $\sigma(1/p_T) \approx 0.20$ (GeV/c) $^{-1}$
- $\sigma(\Theta) \approx 9$ mrad
- $\sigma(dE/dx)/(dE/dx) \approx 0.16$

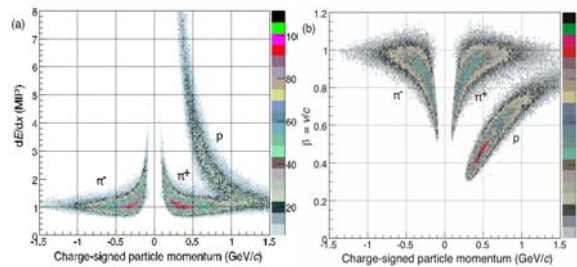
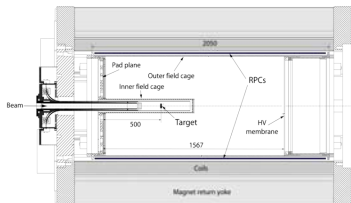
RPCs

- Efficiency $\approx 98\%$
- $\sigma(\text{TOF}) \approx 175$ ps

Good particle identification by combining dE/dx from TPC and TOF from RPCs (Refs. [1-2]).



Large-angle spectrometer TPC and RPCs inside 0.7 T solenoidal magnet

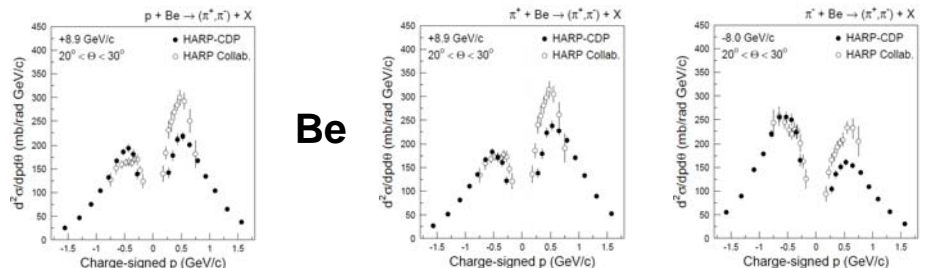


Inclusive cross-sections

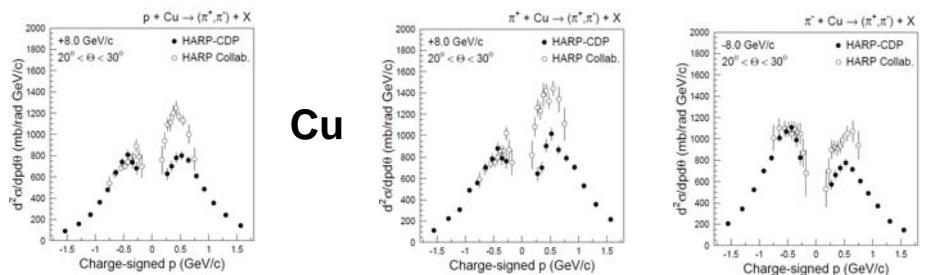
References

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Be



Cu



Ta

