A list of potential papers from MIPP data

MIPP Collaboration

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Abstract

The following is a compendium of potential papers that MIPP can hope to see to publication using acquired data.

I. NUMI RELATED PAPERS

1. Hadron production ratios for proton-nucleus interactions at 120 GeV/c" The π^-/π^+, K^-/K^+, K^+/π^+, K^-/π^- production ratios for the proton-nucleus data (C,Be,Bi).

2. Inclusive hadron production cross-sections for 120 GeV proton-nucleus interactions" Same data set as above, but now absolute cross-sections

3. Hadron production on the NuMI target Hadron yields from the NuMI target. Not really a physics paper, but we need to get it out there somehow.Full particle ID using dE/dx, ToF, CKOV and RICH.

4. Hadron-nucleus interactions in the momentum range from 30-120 GeV Inclusive production cross-sections for the beams $p^\pm, \pi^\pm, K^\pm$ for C,Be,Bi data from 30 GeV on up and various final states. Full particle ID using dE/dx, ToF, CKOV and RICH.

5. Inclusive K_S^0 production from Carbon and NuMI targets.

6. Data-driven cascade model. Show that a cascade model based on the previous papers at 120 GeV and below can be combined to yield good results for the NuMI target

II. NUCLEAR PHYSICS PAPERS

1. Title: Low Energy ($<$ 1 GeV/c) Charged Particle Multiplicities from the Fermilab MIPP experiment (E907) at 58 GeV/c $p^\pm, \pi^\pm, K^\pm$ beams on nuclear targets from A = 1 to 238

   Abstract: The MIPP experiment has used six beam species (proton, pion, Kaon and their anti-particles) at 58 GeV/c momentum to study produced charged particle multiplicities for different identified particle species from 0.15 to 1 GeV/c by using the dE/dx identification in the TPC. Different targest from Liquid Hydrogen to Uranium A=1 to 238 in almost equal steps of log(A). This study is far more detailed than previous studies.

   This study emphasizes the fragmentation of the nucleus and is listed separately from I.4 which studies particle production as a whole. Needs dE/dx, ToF and CKOV for particle id.

III. PAPERS UTILIZING CALORIMETER DATA

1. Inclusive Production of Forward Neutrons from MIPP

2. Inclusive Production of Forward Gammas from MIPP

3. Diffraction Dissociation of Protons on Nuclei from MIPP

   Note that the last should include $p+p \rightarrow p+\pi^0+p$, as well as $p+p \rightarrow p+\pi^+\pi^-+p$. The latter does not necessarily use the calorimeters, but complements the former.

IV. SCALING LAW TESTS USING LIQUID HYDROGEN DATA

One can in principle test the scaling law in 36 inclusive reactions for 6 beam species and 6 outgoing particles. We will start off with the easier sets.

1. Test of the scaling law for the reactions $pp \rightarrow \pi^+ + X$ and $\pi^- p \rightarrow \bar{p} + X$. If the scaling works, both these reactions should have identical branching functions as a function of M^2 for all subsets, due to cross symmetry.

2. Test of the scaling law for the reactions $\bar{p}p \rightarrow \pi^+ + X$, $\pi^- p \rightarrow p + X$, and $\bar{p}p \rightarrow \pi^- + X$, $\pi^+ p \rightarrow p + X$. All 4 reactions should have identical branching functions due to crossing and CP symmetries.

3. The other channels....

V. NUCLEAR CROSS SECTIONS AND OTHER TOPICS

1. Inclusive Cross Sections on Hydrogen as a function beam momentum and species.

2. Inclusive Cross Sections on Uranium at 60 GeV/c beam momentum as a function of species.

3. Comparison of $\bar{\Lambda}$ polarization in $\bar{p}p$ interactions to Λ polarization in pp interactions.

VI. NIM ARTICLES

1. TPC $E \times B$ calibration–Magboltz etc
2. Calorimeter calibration
3. Tagged neutrons?
4. General paper describing the MIPP Apparatus..