anti-neutron reconstruction analysis outline

Main question: how big is a $\bar{p}$ data sample?

All steps are similar to what was done in the neutron analysis with proton beam

Event selection:

- data sample: $\bar{p} + p$ at 58 GeV/c
- good beam track
- trigger and tracking requirements
- counting of incident protons
- vertex position
- reduce straight through

$\bar{n}$ reconstruction steps:

- calorimeter energy scale
- anti-neutron selection
- target-out subtraction

Other steps - on to do list

Event Selection

Use a "good" event sample:

- $N_{trk} \leq$30 per event
- Calo should have readout
- "Good" beam track:
  - single beam track
  - avoid misreconstructed 2-nd trk
  - track position at target
  - track time
- Trigger scintillator is on
- Use events with reliable tracking conditions

Event, beam track selection cuts and efficiencies

Cut name	N(pp 58 GeV)	EFF(pp 58 GeV)	N($\bar{p}p$ 58 GeV)	EFF($\bar{p}p$ 58 GeV)
Total events	802616		1172700	
nTrks$\leq$30	772373	0.962	1085306	0.816
Calo status	772373	1.000	1085297	1.000
Is beam trk?	745447	0.965	1054483	0.972
Single beam trk	480130	0.644	832733	0.790
nCrossing $<$ 5	386237	0.804	664351	0.798
radius$<$1.9cm	300063	0.777	457421	0.689
track time	291234	0.971	448336	0.980
trk divergence	290707	0.998	447258	0.998
P$_{sum}$ $<$1.1P$_{beam}$	275275	0.947	401107	0.897
Total efficiency		0.343		0.342
p and $\bar{p}$ fractions	92414	0.336	23629	0.059

Table 1: Beam track selection cut efficiencies

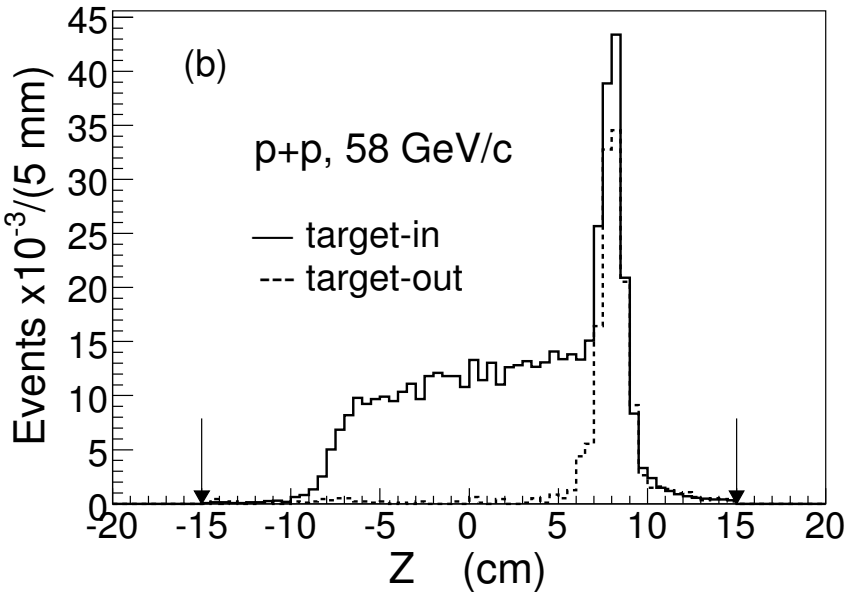
number of the incident anti-protons

	protons	anti-protons
H_2	26205872	208293
Empty Cryo	5585745	112939

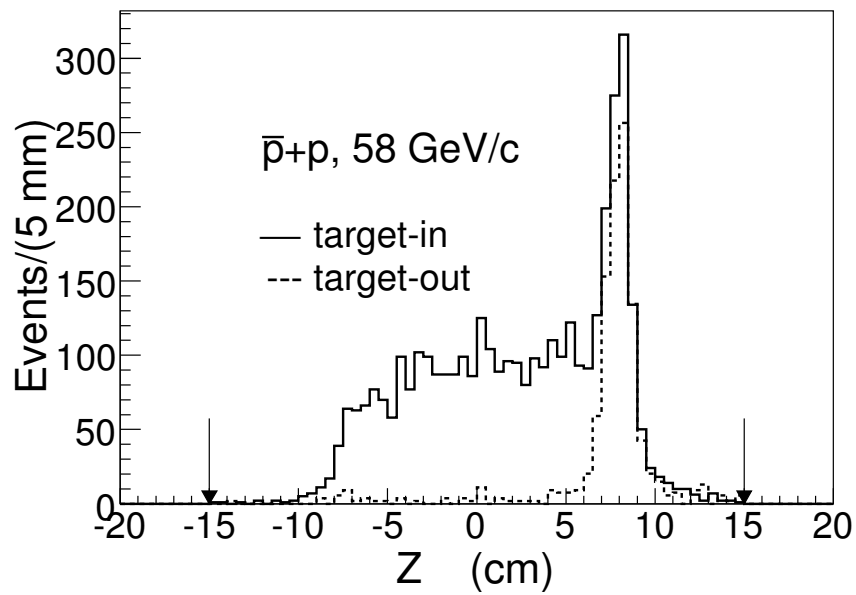
Table 2: The number of incident protons and anti-protons with liquid hydrogen target at 58 GeV/c. They were calculated using the beam trigger events $\times$ prescaler on event-by-event base

Z distributions

$p + p$

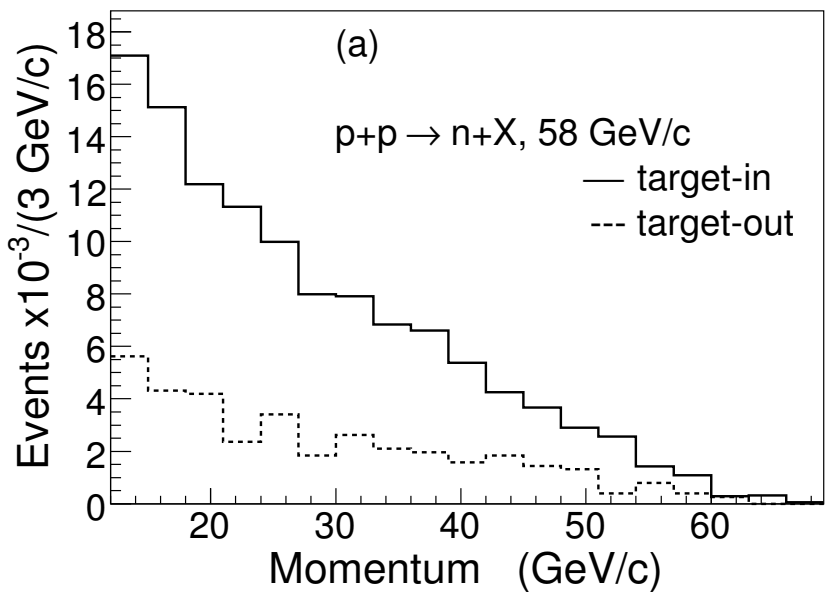


$\bar{p} + p$

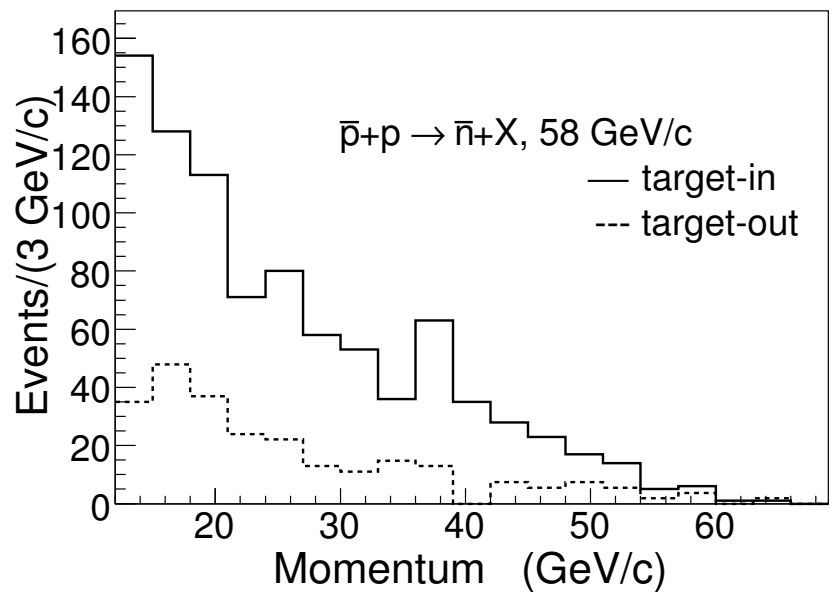


$\bar{n}$ spectrum from $\bar{p} + p \rightarrow \bar{n} + X$

$p + p$



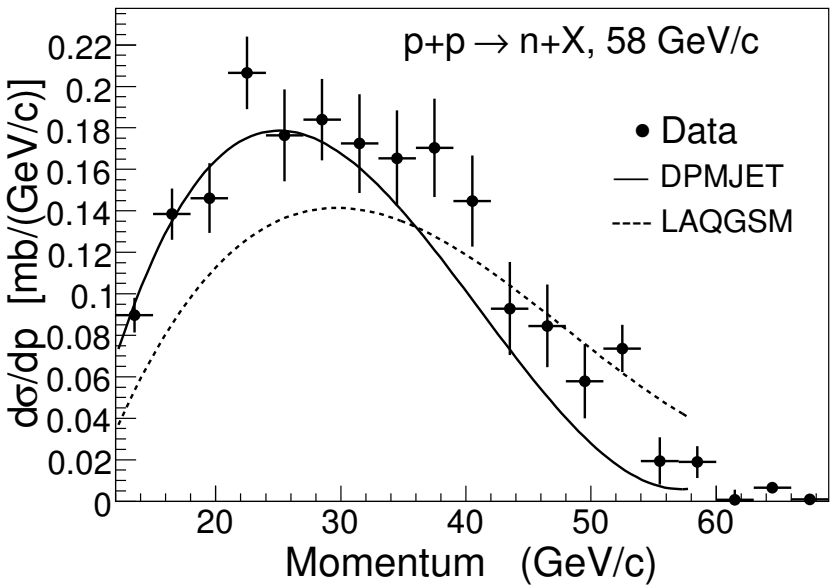
$\bar{p} + p$



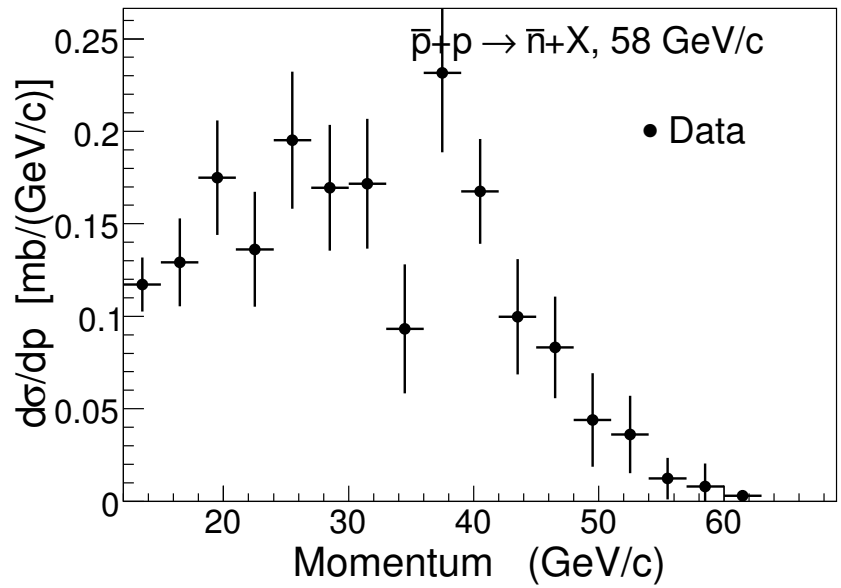
$\bar{n}$ production cross section?

If the single correction function from p+p MC is applicable to $\bar{p} + p$ process, then

$$p + p$$



$$\bar{p} + p$$



available data with other momenta/targets

target	momentum	N_{files}
H_2	-20 GeV/c	269
H_2	-58 GeV/c	279
H_2	-84 GeV/c	238
Be	-58 GeV/c	30
C-2$\%$	-58 GeV/c	1
Bi	-58 GeV/c	49
U	-58 GeV/c	125
Empty Cryo	-20 GeV/c	56
Empty Cryo	-58 GeV/c	92
Empty Cryo	-84 GeV/c	41
Empty thin	-58 GeV/c	14

Table 3: Available number of the data files with negative beam momentum