

ACOL ENERGY AND OPERATION MODES OF THE ANTI-PROTON SOURCE

We shall have four operation modes:

- accumulation mode or antiproton production mode,
- proton through the loop mode (APTST),
- proton via the direct way mode (APTST),
- antiproton ejection mode.

What we already know:

PS energy = AA ejection/injection orbit energy

and we shall have

PS energy = AA ejection/injection orbit energy = AC ejection orbit energy

We shall show that the energies of the rings and of the transfer lines defined in Figure 1 are compatible with the four modes of operation.

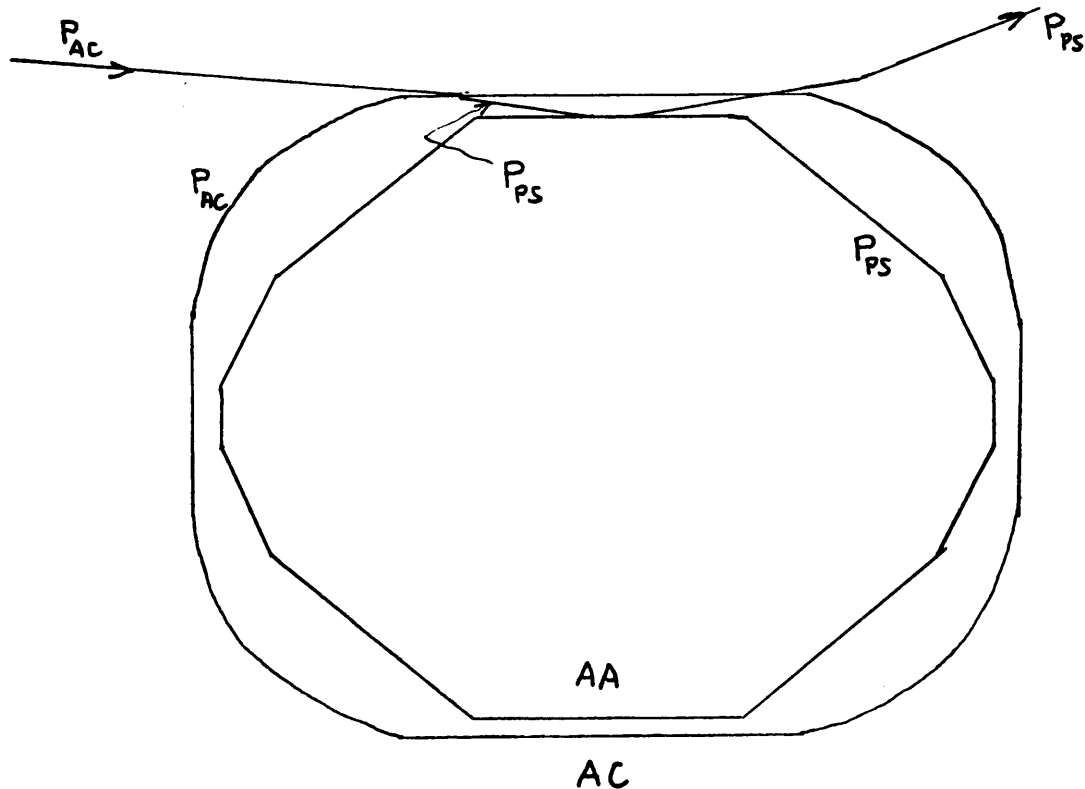


Fig. 1: Definition of the energy in the various elements of the antiproton source.

I Accumulation mode or antiproton production mode

The 26 GeV/c beam is sent on the target. The antiproton produced are transported to the AC and after different operations, this beam is transferred to AA for the accumulation. The discussion is mainly due to the AC ejection.

1. The AC ejection is on the central orbit

This is the design report condition; no comment.

2. The AC ejection is on a non-central orbit

1st case : - AC energy has the design value
- AC ejection is on an inner orbit
- AA energy should be reduced by the same amount.

2nd case : - AC energy has the design value
- AC ejection is on an outer orbit
- AA energy should be increased by the same amount.

3rd case : - AC energy has a lower value ($-\Delta p/p$)
- AC ejection is an outer orbit
- AA energy has the design value.

4th case : - AC energy has a greater value ($+\Delta p/p$)
- AC ejection is on an inner orbit
- AA energy has the design value.

II Protons through the loop mode

As we said before,

PS energy = AA ejection orbit energy = AA injection orbit energy
= AC ejection orbit energy.

For the beam from PS to AC through AA, there is no problem at all. When the beam is on the AC ejection, we can put it on any other orbit with the RF.

Some comments on the reverse ejection from AC to the target:

We can eject the beam from any AC orbit because:

- 1) the injection kickers are located in the zero dispersion region;
- 2) the injection septum is located in the quasi zero dispersion region;

- 3) the transverse emittance is less than 5π mm.mrad and is inside the acceptance (240π mm.mrad for the injected antiprotons and 25π mm.mrad for the ejected antiprotons);
- 4) the longitudinal emittance is few ‰ and is inside the acceptance ($\pm 3\%$ for the injected antiprotons).

III Proton via the direct way mode

The injection line is set up at the AC energy, but we know that the PS energy may be different. In this case also, there is no problem for the same reasons as for the reverse ejection.

IV Antiproton ejection mode

PS energy = AA ejection orbit energy

There is no change. It is the present case.

Conclusion

With the two beams from PS :

- 26 GeV/c beam for the antiproton production,
- APTST beam at only one energy,

we can set up the ACOL complex independently of the choice of the AC ejection orbit.

S. Maury

Distribution

ACOL/1 list
Section OP/MCR
M. Bouthéon
E. Brouzet

/ed