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Summary of Period 1 : 1st March to 31st March 1983

Introduction

Two major changes to the AA stochastic cooling systems were made during the January/February shut-down : the installation of a new stack core transverse cooling pick-up in section 1, and the provision of refrigerated terminations and ferrite microwave absorbers for the stack tail cooling pick-ups in sections 18 and 20. In addition, various hardware modifications to improve machine acceptances, extra radiation shielding to reduce site doses, exchange of doubtful magnet cooling water hoses and preparations for conducting target tests were all squeezed into an extremely tight schedule.

Start-up for AA machine experiments was on 1st March as planned. Altogether during this period 450 hours became available for AA studies. Due to manpower limitations we were only able to use 430 hours and not all of this was taken for work with beams since we needed some time to readjust equipment, in particular the HF cooling lines. One day was taken up in removing parts of the ferrite absorbers found to be interfering with the BST magnet end fields in sections 18 and 20, thus causing unacceptable Q-shifts to the outermost injection orbits.

Modifications to cooling pick-ups

Changes to the cooling systems, which reduce mutual interference and improve signal to noise ratio, have been concisely described by G. Carron et al. in CERN/PS/AA/83-10. Analysis of the results of these improvements and tuning of the new systems continues. Preliminary findings are :

i) The new transverse HF pick-up produces lower stack core emittances faster than the old pick-up. Cooling time after stopping stacking is reduced to a few minutes.

ii) Noise in the stack tail momentum system is down by 4 dB. Experiments with reverse polarity have shown that this system is capable of handling full design intensity of 2.5×10^7 $\bar{p}$ per pulse.

iii) The attenuation of microwave signals due to TE modes in the stack tail momentum pick-ups has not been entirely successful. More work is needed here.

Machine acceptance and soft aperture studies

After a great deal of persistance on the part of the experimenters, the AA aceptance has been increased by about 10% in both planes so that we now have : A_H/π = 90 to 95 mm mrad and A_V/π = 78 to 82 mm mrad.

The soft aperture limit, or the shortage of $\bar{p}$'s at large betatron amplitudes has been shown to be frequency or momentum dependent but attempts to relate $\bar{p}$ losses with particular non-linear resonances have so far failed. Again more work is needed.

Conducting target tests

A 3 mm diameter copper target placed about 20 cm upstream of a conventional magnetic horn was connected electrically in series with the horn. Numerical computations predicted a 20% improvement in $\bar{p}$ yield over the standard target-horn arrangement with the yield peaking at lower horn current. This was indeed observed during the tests. Maximum $\bar{p}$ yield was consistently above 8×10^{-7} $\bar{p}/p$. The design and fabrication of an operational version is proceeding.

Conclusions

Some details of the experiments during Period 1 are still to be analyzed and fine tuning of the machine continues. Although the machine aperture is greater than in 1982, standard $\bar{p}$ yield, missing factors and p accumulation rates have not yet shown the expected improvement. We are hopeful that this will appear with further tuning. A summary of the present performance, prepared by E. Jones, is appended.

Reported by C.D. Johnson

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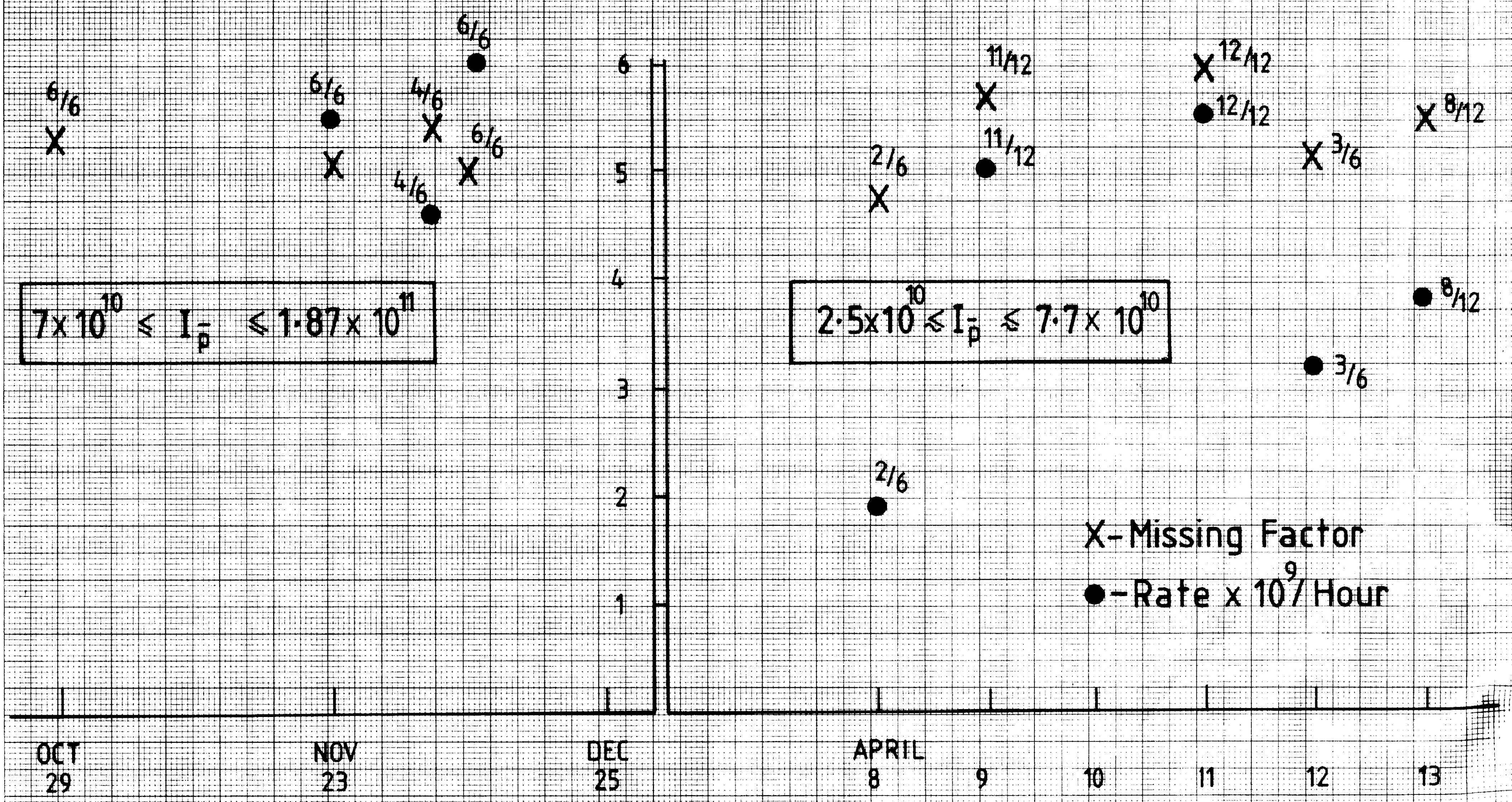

At present : $\epsilon_V \sim \epsilon_H \sim 3\pi$ 1 min. after stopping stacking

$\epsilon_V \sim \epsilon_H \sim 1{\cdot}7\pi$ 15 min. after stopping

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