ENTRY NO. 38

NAME OF MACHINE ..... MILAN SUPERCONDUCTING CYCLOTRON

INSTITUTION ... UNIVERSITY OF MILAN - INFN (ITAL. NATIONAL INSTITUT FOR NUCLEAR PHYSICS)

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IN CHARGE .... F.G. RESMINI ..... REPORTED BY .... E. ACERBI

HISTORY AND STATUS

DESIGN, date 1975-76 ..... Model tests 1977

ENG DESIGN, date 1979

CONSTRUCTION, date STARTED FEB. 1981

FIRST BEAM, date (or goal) .... 1986 (GOAL)

MAJOR ALTERATIONS

COST, ACCELERATOR APPROX 7 M $

COST, FACILITY, total

FUNDED BY INFN

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ..... 12 ..... ENGINEERS 4

TECHNICIANS .... 14 ..... CRAFTS 9

GRAD STUDENTS involved during year 4

OPERATED BY ..... Research staff or ..... Operators

OPERATION ..... hr/wk. On target ..... hr./wk

TIME DISTR. in house ..... % Outside ..... %

BUDGET, op & dev

FUNDED BY

RESEARCH STAFF, not included above

USERS, in house ..... outside .....

GRAD STUDENTS involved during year

RESEARCH BUDGET, in house

FUNDED BY

MAGNET

POLE FACE, diameter (compact) .180 .. cm, R extraction 86.7 cm

R injection 16-25cm

GAP, min ..8.6 cm, Field ..56 ..... kG

max .91.6cm, Field ..40 ..... kG } at .6.55.10^{6}

AVERAGE FIELD at R ext .... 48 ..... kG } Ampere turns

B max/ < B > ...1.17

NUMBER OF SECTORS { compact .3 ..... ; separated ..... } Spiral, max 69 deg

SECTOR ANGLE (SSC) ..... deg

TRIMMING COILS .20 - Conductor: copper 6x6 mm^{2}

.....3 mm Ø hole

CONDUCTOR, material and type ... Main coils=Superc. Nb-Ti

STORED ENERGY (cryogenic) .... 40 ..... MJ

POWER: main coils ..... max, kW; current stability 10^{-5}

trimming coils .60 ..... max, kW; current stability 10^{-4}

WEIGHT: Fe ..176 ..... tons; coils ...9.7 ..... tons

COOLING system ... L. He bath

ION ENERGY (bending limit) E/A = ...800 ..... q^2/a^2 MEV/amu

(focusing limit) E/A = ...200 ..... q/a MeV/amu

ACCELERATION SYSTEM

DEES, number .....3 ..... angle ....58 ..... deg

BEAM APERTURE .....2.5 ..... cm; DC Bias ..... kV

TUNED by, coarse SHORT CIRCUIT ... fine TUNING CAPACITOR

RF .....15 ..... to .....48 ..... mHz, stable ± $1\ 10^{-6}$

Orb F .....5 ..... to ..25 ..... mHz

HARMONICS, RF/Orb F, used .1,2,3,4

DEE—Gnd, max .100 ..... kV, min gap ....1.5 ..... $^{-4}$ cm

STABILITY, (pk-pk noise)/(pk RF volt) 10

ENERGY GAIN, max ..600 x (Z/A) ..... kV/turn

RF PHASE, stable to ± ...2 ..... deg

RF POWEP input, max ....180 ..... kW

FREQUENCY MODULATION, rate ..... /s

modulator, type .....

beam pulse, width .....

VACUUM SYSTEM

OPERATING PRESSURE .... 10^{-7} ..... Torr or mbar

PUMPS, No, Type, Size ... CRYOPUMP

ION SOURCES

..INTERNAL..(P.I.G.)..EXTERNAL..(E.C.R.)

INJECTION SYSTEM

RADIAL FROM 16 MV TANDEM AND AXIAL FROM ECR

EXTRACTION SYSTEM

ELECTROSTATIC-MAGNETIC

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed ..... m^2; movable ..... m^2

TARGET STATIONS ..... in .....

STATIONS served at same time, max .....

MAG SPECTROGRAPH, type .....

COMPUTER model .....

OTHER FACILITIES .....

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
q/A=0.5	100 MeV/n	.....	10^{12} pps	.....
U^{38+}	20 MeV/n	.....	10^{11} pps	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
SECONDARY		(part/s)		
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

BEAM PROPERTIES

MEASURED	CONDITIONS
PULSE WIDTH.....RF deg	..... pμ A of ..... MeV ..... ions
PHASE EXC. max.....RF deg	..... pμ A of ..... MeV ..... ions
EXTRACT eff .....%	..... pμ A of ..... MeV ..... ions
RESOL ΔE/E.....%	..... pμ A of ..... MeV ..... ions
EMITTANCE (π mm. mrad) { .....axial ; .....rad }	..... pμ A of ..... MeV .....

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS ..... SOLID STATES PHYSICS.....

BIOMEDICAL APPLICAT..... ISOTOPE PRODUCTIONS .....

REFERENCES/NOTES

1) E. Acerbi et al. IX Int. Conf. on Cyclotron 169 (1981)

2) E. Acerbi et al. IEEE Trans on NS 30,2126 (1983)

PLAN VIEW OF FACILITY, COMMENTS, ETC.