

ENTRY NO. 40

NAME OF MACHINE Ispra Cyclotron
 INSTITUTION Joint Research Centre (Operated by E.E.C.)
 ADDRESS 21020 Ispra (VA), Italy
 TEL 0039 332 789895 TELEX 380042 = 380058 EUR I
 IN CHARGE M. Castiglioni REPORTED BY M. Castiglioni

HISTORY AND STATUS

DESIGN, date, Model tests
 ENG DESIGN, date MC-40-SCANDITRONIX
 CONSTRUCTION, date
 FIRST BEAM, date (or goal) 1982
 MAJOR ALTERATIONS

COST, ACCELERATOR 9x10⁶ SKR
 COST, FACILITY, total 1.1x10⁷ SKR (Excl. Bld.)
 FUNDED BY E.E.C.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 2
 TECHNICIANS 3 CRAFTS 2
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or 4 Operators
 OPERATION 55 hr/wk. On target 44 hr/wk
 TIME DISTR, in house 50 %, outside 50 %
 BUDGET, op & dev 1.5 x 10⁵ ECU
 FUNDED BY E.E.C.

RESEARCH STAFF, not included above

USERS, in house 4 outside 6
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house 4.8 x 10⁵ \$
 FUNDED BY E.E.C.

MAGNET

POLE FACE, diameter (compact) 135 cm, R-extraction 50 cm
 R injection cm
 GAP, min 10 cm, Field 21.2 kG }
 max 18 cm, Field 13.3 kG } at 241,000
 AVERAGE FIELD at R ext 17.9 kG } Ampere turns
 B max / < B > 1.19

NUMBER OF SECTORS { compact 3 } Spiral, max 4.5 deg
 { separated }
 SECTOR ANGLE (SSC) deg

TRIMMING COILS 8 circular coils
4 sets of harmonic coils

CONDUCTOR, material and type Cu
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 100 max kW; current stability 10⁻⁵
 trimming coils 10 max kW; current stability 10⁻⁴

WEIGHT: Fe 57 tons; coils 2.4 tons
 COOLING system Demineralized water
 ION ENERGY (Bending limit) E/A = .40 q²/A² MeV/amu
 (Focusing limit) E/A = q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 2 angle 90° deg
 BEAM APERTURE 2 cm; DC Bias 0 kV
 TUNED by, coarse mov. short fine var. capacitor
 RF 12.5 to 27 MHz, stable ± 10⁻⁶
 Orb F to MHz
 HARMONICS, RF/Orb F, used 1 and 2
 DEE-Gnd, max 44 kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10⁻³
 ENERGY GAIN, max 176 kV/turn
 RF PHASE, stable to ± 0.5 deg
 RF POWER input, max. 60 kW
 FREQUENCY MODULATION, rate %
 modulator, type
 beam pulse, width 15-20 deg

VACUUM SYSTEM

OPERATING PRESSURE 2x10⁻⁶ Torr or mbar
 PUMPS, No, Type, Size 2 Turbo molecular
Leybold Heraeus type 3.500

ION SOURCES

Internal cold cathode, axially mounted

INJECTION SYSTEM**EXTRACTION SYSTEM**

Electrostatic Deflector, Magn. Channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 280 m²; movable m²
 TARGET STATIONS 4 (+3) in 3 cells rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES Helium jet cooling system
for targets

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
Protons		<u>38</u>	<u>100</u>	<u>65</u>
Deuterons		<u>19</u>	<u>100</u>	<u>65</u>
Alfa		<u>38</u>	<u>60</u>	<u>30</u>
SECONDARY			(part/s)	

BEAM PROPERTIES

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

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS 10%
 Radiation damage and α-implantation in fusion
 reactors materials 90%

REFERENCES/NOTES

- 1)
- 2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.