

ENTRY No. 59

NAME OF MACHINE SIN Injector Cyclotron II 1) Date July 31, 1981
 INSTITUTION Swiss Institute for Nuclear Research
 ADDRESS CH - 5234 Villigen, Switzerland
 TEL(0)56/99 31 11 TELEX 5 46 40 sin.ch
 IN CHARGE U. Schryber REPORTED BY W. Joha / U. Schryber

HISTORY AND STATUS

DESIGN, date 1972 Model tests 1973/80
 ENG DESIGN, date 1973/80
 CONSTRUCTION, date 1978/83
 FIRST BEAM, date (or goal) May 1983
 MAJOR ALTERATIONS

COST, ACCELERATOR approx. 18 MSFr.
 COST, FACILITY, total 134 MSFr.
 FUNDED BY Swiss Federal Government

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT 2)

SCIENTISTS ENGINEERS
 TECHNICIANS CRAFTS
 GRAD STUDENTS involved during year
 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 2)

USERS, in house outside
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house
 FUNDED BY

MAGNET

POLE FACE, diameter (compact) 760 cm, R extraction 370 cm
 R injection 46 cm
 GAP, min 3.5 cm, Field 11.0 kG } at 3*10⁴
 max 3.5 cm, Field 11.0 kG }
 AVERAGE FIELD at R ext 3.3 kG } Ampere turns
 B max/ 3.3
 NUMBER OF SECTORS { compact 4 } Spiral, max 0 deg
 { separated 27 }
 SECTOR ANGLE (SSC) 27 deg
 TRIMMING COILS 9 pairs per magnet 3)

CONDUCTOR, material and type OFHC-copper
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 4x35 max, kW ; current stability 5*10⁻⁶
 trimming coilstot. 15max, kW ; current stability 5*10⁻⁵
 WEIGHT: Fe 4x180 tons ; coils 4x0.96 tons
 COOLING system demin. water
 ION ENERGY (bending limit) E/A = 72 MeV p
 (focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM 4)

DEES, number 2 ; angle 18°(RF) 20°(geom.)
 BEAM APERTURE 4 cm ; DC Bias 7 kV
 TUNED by, coarse fine Trim. Cap.
 RF 50.63 to 7. mHz, stable ± 10⁻⁶
 Orb F 5.063 to 7. mHz
 HARMONICS, RF/Orb F, used 10
 DEE - Gnd, max 250 kV, min gap 3.0 cm
 STABILITY, (pk-pk noise)/(pk RF volt) < 3*10⁻⁴
 ENERGY GAIN, max 1000 keV/turn
 RF PHASE, stable to ± 0.01 deg
 RF POWER input, max incl. beam power 2 x 200 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 3*10⁻⁶ Torr or mbar
 PUMPS, No, Type, Size 6 turbo-molecular pumps
 at 2000 l/s

REMARKS

1) The SIN Injector Cyclotron II has two stages. The first stage is an 860 keV DC accelerator with a Cockroft-Walton type high voltage generator (not described here). The second stage is an isochronous ring cyclotron for fixed frequency, under construction (see Proc. of Zürich and Caen Conf. on Cyclotrons, 1975 and 1981).

INJECTION SYSTEM

Axial, at 860 keV, magn. cone with n = 0.6

EXTRACTION SYSTEM

2 septum magnets 5.5° and 39.5° resp.

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed m²; movable 2) m²
 TARGET STATIONS in rooms
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
p	72		>1000	>1000

SECONDARY

(part/s)

BEAM PROPERTIES

GOAL AT 1000 µA	CONDITIONS
PULSE WIDTH 36 RF deg	µA of MeV ions
PHASE EXC, max RF deg	µA of MeV ions
EXTRACT eff 100 %	µA of MeV ions
RESOL ΔE/E ~ 0.2 %	µA of MeV ions
EMITTANCE	
(π mm. mrad) { 2 axial } { 2 rad }	µA of MeV ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS
 INJECTION INTO 590 MeV RING CYCLOTRON 100 %
 ISOTOPE PRODUCTION (~100 µA) PARASITIC
 REMARKS CONTD.

- See SIN 590 MeV Ring Cyclotron (this compilation)
- Special coils outside vacuum chamber for correction of isochronism
- RF system: it consists of 2xλ/2 resonators resonating at 50.6 MHz and 2 TE₁₁ cavities resonating at 151.8 MHz to "flattop" the accelerating voltage.

PLAN VIEW OF INJECTOR II UNDER CONSTRUCTION

