NAME OF MACHINE __S.I.N. Injector Cyclotron II__ [1)] DATE __Aug. 78__

INSTITUTION __Swiss Institute for Nuclear Research (S.I.N.)__

ADDRESS __CH - 5234 Villigen, Switzerland__

IN CHARGE __J.-P. Blaser__ REPORTED by __U. Schryber/W. Joho__

HISTORY AND STATUS

DESIGN, date __1972__ MODEL tests __1973/78__

ENG. DESIGN, date __1973 - 1978__

CONSTRUCTION, date __1978 -__

FIRST BEAM date (or goal) __1982__

MAJOR ALTERATIONS __Cyclotron under construction__

OPERATION, _____ hr/wk; On Target _____ hr/wk

TIME DIST., in house _____ %, outside _____ %

USERS' SCHEDULING CYCLE _____ weeks

COST, ACCELERATOR __approx. 18 MSw. Fr.__

COST, FACILITY, total _____

FUNDED BY __Swiss Federal Government__

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS _____ ENGINEERS _____

TECHNICIANS _____ CRAFTS _____

GRAD STUDENTS involved during year _____

OPERATED BY _____ Res staff or _____ Operators

BUDGET, op & dev _____

FUNDED BY _____

RESEARCH STAFF, not included above 2)

FACILITIES FOR RESEARCH 2)

REFERENCES/NOTES

1) Isochronous ring cyclotron for fixed frequency, under construction.
(See Proc. 7th Int. Conf. on Cycl. and their Applications, Birkhäuser, Basel, p. 123)

2) See S.I.N. Isochronous Ring Cyclotron (this compilation)

3) Design values

4) Special coils outside vacuum chamber for correction of isochronism and vertical steering

MAGNET 4 separated sector magnets

POLE FACE diameter __760__ cm; R extraction __370__ cm

GAP, min __3.5__ cm; Field __10.0__ kG ⎫
max __3.5__ cm; Field __10.4__ kG ⎬ at __.03__ $\times 10^6$ hill ampere turns per magn.

AVERAGE FIELD at R ext __3.5__ kG ⎭

CURRENT STABILITY __2__ parts/10^6; $B_{max}/\langle B\rangle$ __3.0__

NUMBER OF SECTORS __4__ ; SPIRAL, max __0__ deg

POLE FACE COIL PAIRS: AVF __1__ /sec;

Harmonic correction __4)__

Rad grad _____ /sec or Circ coils __-__

WEIGHT: Fe __4x180=720__ tons; Coils __4x.96__ tons

CONDUCTOR, Material and type __OFHC-copper__

STORED ENERGY __4 x .12__ MJ

COOLING SYSTEM __demin. water__

POWER: Main coils __4 x 35__ max, kW

Trimming coils __approx. 2 kW/mag__ max, kW

YOKE/POLE AREA __80__ %

SECTOR ANGLE (Sep Sec) __approx. 28__ deg

ION ENERGY (Bending limit) E/A = __72__ q^2/A^2 MeV

(Focusing limit) E/A = _____ q/A MeV

ACCELERATION SYSTEM 3)

$\lambda/2$ Resonator __2__ angle __18° (RF)__ deg

BEAM APERTURE __4__ cm; DC BIAS __-__ kV

TUNED by, coarse __-__ fine __Trim. Cap.__

RF __50.6__ mHz, stable ± _____ /10^6

Orb F _____ to __5.06__ mHz; GAIN __400 ÷ 1000__ kV/turn

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}__

RF PHASE stable to ± __1__ deg

RF POWER input, max __2 x 170__ kW

RF PROTECT circuit, speed _____ μsec

Type _____

FREQUENCY MODULATION, rate __-__ /sec

MODULATOR, type __-__

BEAM PULSE, width __-__

VACUUM SYSTEM

PUMPS, No., Type, Size __6 x 2000 1/s turbo-molecular pumps__

OPERATING PRESSURE __5 · 10^{-6}__ μTorr,

PUMPDOWN TIME _____ hrs

ION SOURCES/INJECTION SYSTEM

EXTRACTION SYSTEM

__2 septum magnets 5° and 40°__

CONTROL SYSTEM

__existing, access to two computers__
(PDP 11/40 and PDP 11/60)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	72	
CURRENT		(µA)	(µA)
Internal	p	$\geq$1000	
External	p	$\geq$1000	
		(part/s)	(part/s)
Secondary			

BEAM PROPERTIES

Goal Conditions

Pulse Width	15 RF deg	___ µA of	___ MeV	___
Phase Exc, max	___ RF deg	___ µA of	___ MeV	___
Extract Eff	___ %	___ µA of	___ MeV	___
Res, $\Delta E/E$	___ %	___ µA of	___ MeV	___

Emittance

(mm-mrad) $\left\{ \begin{array}{l} \pi \cdot 2 \text{ axial} \\ \pi \cdot 2 \text{ radial} \end{array} \right\}$ 1000 µA of 72 MeV p

OPERATING PROGRAMS, time dist

Basic Nuclear Physics _____ %
Solid State Physics _____ %
Bio-Medical Applications under investigation
Isotope Production parasitic ~50 %
Development Injection into 600 MeV –
_____ ring 100 %
_____ %

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES

The S.I.N. Injector Cyclotron II has two stages. The first stage is a 800 keV DC accelerator with a Cockcroft-Walton type high voltage generator. The 40 keV beam from the ion source is analyzed in a beam transport-system prior to injection into the accelerating column.