ENTRY NO. 12

NAME OF MACHINE MGC DATE 78-09-21

INSTITUTION Acceleratorlaboratoriet vid Åbo Akademi

ADDRESS Porthansgatan 3-5 20500 Åbo 50 FINNLAND

IN CHARGE Mårten Brenner REPORTED by Jan Arhippainen

HISTORY AND STATUS

DESIGN, date _____ MODEL tests _____

ENG. DESIGN, date _____

CONSTRUCTION, date Dec.1973 to Oct.1974

FIRST BEAM date (or goal) July 1974 Int/Ext

MAJOR ALTERATIONS _____

OPERATION, 30 hr/wk; On Target _____ hr/wk

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

USERS' SCHEDULING CYCLE _____ weeks

COST, ACCELERATOR 4×10^6 Fmk

COST, FACILITY, total _____

FUNDED BY Finnish Government

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS _____ ENGINEERS 1

TECHNICIANS 1 CRAFTS _____

GRAD STUDENTS involved during year 2

OPERATED BY _____ Res staff or 4 Operators

BUDGET, op & dev 40.000 Fmk

FUNDED BY Government 75%

Privat funds 25%

RESEARCH STAFF, not included above

USERS, in house 8 outside 13

GRAD STUDENTS involved during year 7

RES. BUDGET, in house 54.000 Fmk

FUNDED BY Government 85%

Privat funds15%

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 50 m^2

movable 140 m^2

TARGET STATIONS 4 in 2 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type _____

COMPUTER, model PDP 11/10

OTHER FACILITIES _____

Scattering Chamber

REFERENCES/NOTES

Basargin,Bogdanov,Finkelstein, Galeev,Galchuk,Glukhikh,Gusev, Malishev,Popov,Stepanov,Stogov Proc. 6th Intern.Cycl.Conf. Vancouver (1972), Am.Inst.Phys. (1972) 102

* MP -movable panels
VC -variable capacitors
TC -trim capacitors

MAGNET

POLE FACE diameter 103 cm; R extraction 45 cm

GAP, min 7,2 cm; Field 16,5 kG
max 12 cm; Field 12,5 kG
} at .12 $\times 10^6$ ampere turns

AVERAGE FIELD at R ext 14,5 kG

CURRENT STABILITY 100 parts/10^6; $B_{max}/\langle B \rangle$ 1,13

NUMBER OF SECTORS 3 ; SPIRAL, max 35 deg

POLE FACE COIL PAIRS: AVF _____ /sec;

Harmonic correction 2per sector

Rad grad _____ /sec or Circ coils 4

WEIGHT: Fe 24 tons; Coils 1,2 tons

CONDUCTOR, Material and type Cu tube

STORED ENERGY _____ MJ

COOLING SYSTEM Demineralised water

POWER: Main coils 35 max, kW

Trimming coils 1 max, kW

YOKE/POLE AREA 100 %

SECTOR ANGLE (Sep Sec) _____ deg

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

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

ACCELERATION SYSTEM

DEES, number 2 angle 140 deg

BEAM APERTURE 1,9 cm; DC BIAS -- kV

TUNED by, coarse MP * fine VCman/TCauto

RF 8,5 to 25,5 mHz, stable ± 10 $/10^6$

Orb F (to _____ mHz; GAIN, max 120 kV/turn

HARMONICS, RF/Orb F, used 1, 3

DEE-Gnd, max 35 kV, min gap 0,4 cm

STABILITY, (pk-pk noise)/(pk RF volt) 0,001

RF PHASE stable to ± 5 deg

RF POWER input, max 180 kW

RF PROTECT circuit, speed 5 μsec

Type Thyratron

FREQUENCY MODULATION, rate _____ /sec

MODULATOR, type _____

BEAM PULSE, width _____

VACUUM SYSTEM

PUMPS, No., Type, Size 2 diffusion pumps 35 cm

OPERATING PRESSURE 5 μTorr,

PUMPDOWN TIME 6 hrs

ION SOURCES/INJECTION SYSTEM

Hot-Filament Livingston

EXTRACTION SYSTEM

Electrostatic deflector+mag.chan.

CONTROL SYSTEM

conventional

ENTRY NO. 12 (cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	18	19
	d	10	10
	$^3\alpha$	20	21
	^{3}He	24	29
CURRENT		(μA)	(μA)
Internal	p, d	300	120
	$^3\alpha$	50	100
	^{3}He	50	90
External	p, d	50	60
	$^3\alpha$	25	40
	^{3}He	25	37
		(part/s)	(part/s)
Secondary			

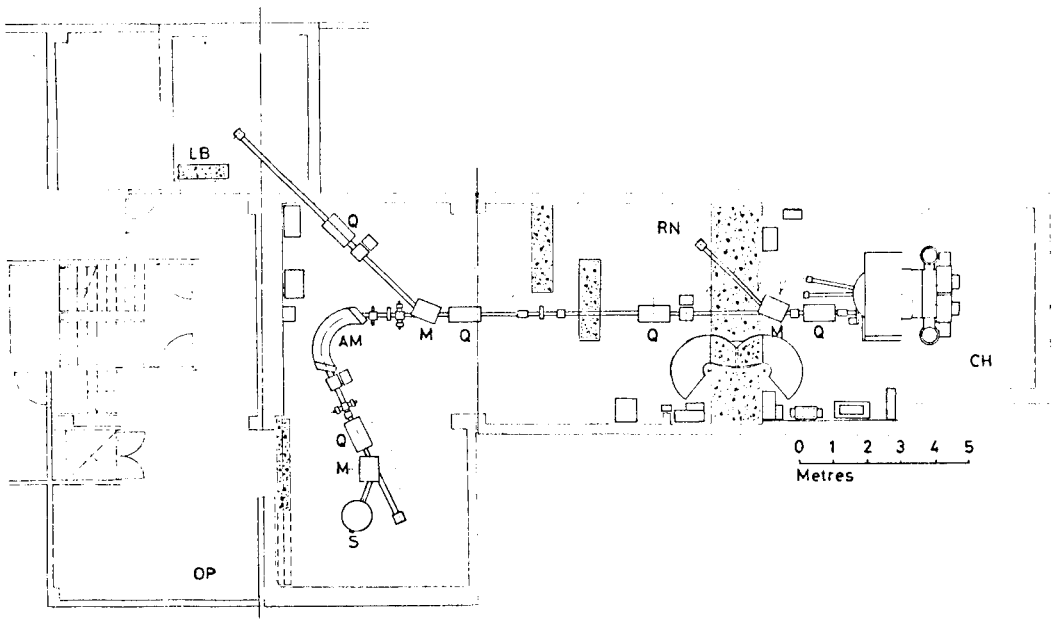
BEAM PROPERTIES

	Measured	Conditions
Pulse Width	____ RF deg	____ μA of ____ MeV ____
Phase Exc, max	____ RF deg	____ μA of ____ MeV ____
Extract Eff	50 %	20 μA of α MeV 21
Res, ΔE/E	0,3 %	0,4 μA of p MeV 18
Emittance		
(mm-mrad) { ____ axial, ____ radial }		____ μA of ____ MeV ____

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	20 %
Solid State Physics	%
Bio-Medical Applications	30 %
Isotope Production	40 %
Development	10 %
	%
	%

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



The layout of the compact cyclotron at Åbo Akademi(Finland): Q = quadropole lens, M = bending magnet, AM = analysing magnet, S = Scattering Chamber, LB = low background area, OP = controlroom, CH = cyclotron vault, RN = position for isotop production.