

ENTRY NO. 51

NAME OF MACHINE Stockholm 225-cm Cyclotron DATE Oct. 1978
 INSTITUTION Research Institute of Physics
 ADDRESS S-104 05 Stockholm 50, Sweden

IN CHARGE C.J. Herrlander REPORTED BY H. Atterling

HISTORY AND STATUS

DESIGN, date 1946 MODEL tests 1946 (RF)
 ENG. DESIGN, date 1946 (start)
 CONSTRUCTION, date 1946 (start)
 FIRST BEAM date (or goal) at full radius 1951
 MAJOR ALTERATIONS New RF system in operation since 1973
 OPERATION, hr/wk; On Target ≈ 40 (a) hr/wk
 TIME DIST., in house %, outside %
 USERS' SCHEDULING CYCLE weeks
 COST, ACCELERATOR
 COST, FACILITY, total
 FUNDED BY Sw. Govt., Sw. Atom. Committee, Wallenberg Foundation and other funds
ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 3 ENGINEERS and
 TECHNICIANS 12-14 CRAFTS 1
 GRAD STUDENTS involved during year
 OPERATED BY Res staff or X Operators
 BUDGET, op & dev
 FUNDED BY Sw. Govt., Sw. Nat. Sci. Res. Council, and Wallenberg Foundation

RESEARCH STAFF, not included above
 USERS, in house and outside ≈ 50
 GRAD STUDENTS involved during year
 RES. BUDGET, in house
 FUNDED BY Sw. Govt., Sw. Nat. Sci. Res. Council, and private funds

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed m²
 movable 5 caves (see Fig.) 175 m²
 TARGET STATIONS in rooms
 STATIONS served at same time, max 1 (cf. Fig.)
 MAG SPECTROGRAPH, type
 COMPUTER, model PDP 11/70 + PDP 11/55
 OTHER FACILITIES Ref. to the Institute's Annual Reports

REFERENCES/NOTES

(a) Operation recently resumed after a long-lasting shutdown, necessitated by construction and installation work. The beam-on-target time given was recorded prior to mid-March 1977.
 (b) The poles are extended by steel discs tapered to a diam. of 211 cm.
 (c) Max. field used; max. attainable field about 20 kG.

MAGNET

POLE FACE dia 225 (b) cm; R extraction 90 cm
 GAP, ~~min~~ 33 cm; Field 16 (c) kG } at X 10⁶
~~max~~ cm; Field kG } ampere turns
 AVERAGE FIELD at R ext kG
 CURRENT STABILITY 10 parts/10⁶; B_{max}/⟨B⟩
 NUMBER OF SECTORS ; SPIRAL, max deg
 POLE FACE COIL PAIRS: AVF /sec;
 Harmonic correction
 Rad grad /sec or Circ coils
 WEIGHT: Fe 370 tons; Coils 27 tons
 CONDUCTOR, Material and type Cu bars, hollow
 STORED ENERGY MJ
 COOLING SYSTEM deionized water
 POWER: Main coils at 16 kG 125 max, kW
~~Trimming coils~~ max, kW
 YOKE/POLE AREA %
 SECTOR ANGLE (Sep Sec) deg
 ION ENERGY (Bending limit) E/A = q²/A² MeV
 (Focusing limit) E/A = q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 180 deg
 BEAM APERTURE 12-5 cm; DC BIAS 0 kV
 TUNED by, coarse short. pl. fine trim. cap.
 RF 7.8 to 10 mHz, stable ± 0.01 /10⁶
 Orb F to mHz; GAIN, max kV/turn
 HARMONICS, RF/Orb F, used 1
 DEE-Gnd, max 120 kV, min gap 8 cm
 STABILITY, (pk-pk noise)/(pk RF volt) ≤ 0.2 %
 RF PHASE stable to ± deg
 RF POWER input, max 250 kW
 RF PROTECT circuit, speed μsec
 Type ignitron crowbar
 FREQUENCY MODULATION, rate /sec
 MODULATOR, type
 BEAM PULSE, width

VACUUM SYSTEM

PUMPS, No., Type, Size 3 oil diffusion pumps (one 50 cm, two 40 cm)
 OPERATING PRESSURE ≈ 5 μTorr,
 PUMPDOWN TIME 8-10 hrs

ION SOURCES/INJECTION SYSTEM

internal PIG source; for heavy ions indirectly heated cathode

EXTRACTION SYSTEM

electrostatic deflector

CONTROL SYSTEM

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	_____	10-15
	d	_____	20-30
	α	_____	40-60
CURRENT	$^{12}\text{C}^{4+}$ (d)	_____	120
		(μA)	(μA)
Internal	_____	_____	_____
External	α	_____	0.1 nA - \approx 5 μA
at target	$^{12}\text{C}^{4+}$	_____	0.1-10 nA
in exp. area		(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	_____ % _____ μA of _____ MeV _____	
Res, $\Delta E/E$	_____ % _____ μA of _____ MeV _____	
Emittance	(mm-mrad) { _____ axial } _____ μA of _____ MeV _____	
	{ _____ radial }	

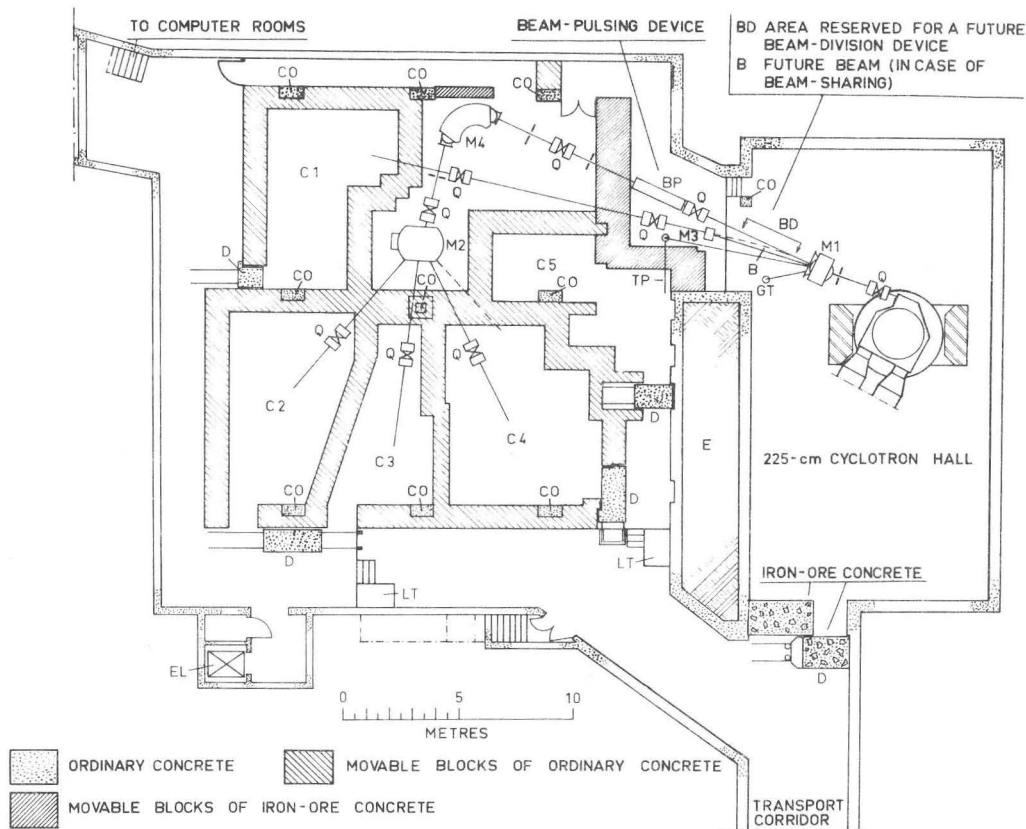
OPERATING PROGRAMS, time dist

Basic Nuclear Physics	_____	mainly	_____ %
Solid State Physics	_____		_____ %
Bio-Medical Applications	_____	yes	_____ %
Isotope Production	_____	yes	_____ %
Development	_____		_____ %
	_____		_____ %

(d) External beams of other heavy ions to be developed.

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

REFERENCE: H. Atterling and G. Lindström, Arkiv för Fysik 15 (1959) 483.
Major modifications are described in the Annual Reports.



The Fig. shows the lower floor of the recently built 2-story experimental hall. The first beam line to the new area (to C1) was tested in June 1978. Two more beam lines are scheduled for completion before mid-1979. Cave C5 is being equipped for processing of bombarded target material. On the upper floor a shielded area is being arranged for bio-medical synthesis work. On this floor is also the counting laboratory. For details, reference is made to the 1977 Annual Report.