

ENTRY NO. FM-7

NAME OF MACHINE Uppsala Synchrocyclotron DATE August 1978  
INSTITUTION The Gustaf Werner Institute, University of Uppsala  
ADDRESS Box 531, S-751 21 Uppsala, Sweden

IN CHARGE Prof. Helge Tyrén REPORTED by Stig Holm

#### HISTORY AND STATUS

DESIGN, date 1946 MODEL tests 1947  
ENG. DESIGN, date 1946-1951  
CONSTRUCTION, date 1947 - 1951  
FIRST BEAM date (or goal) int. Dec.-51 ext.-56  
MAJOR ALTERATIONS Complete reconstruction  
1977-  
OPERATION,          hr/wk; On Target          hr/wk  
TIME DIST., in house          %, outside          %  
USERS' SCHEDULING CYCLE          weeks  
COST, ACCELERATOR           
COST, FACILITY, total           
FUNDED BY Gustaf Werner

#### ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 15 ENGINEERS 7  
TECHNICIANS 4 CRAFTS 7  
GRAD STUDENTS involved during year           
OPERATED BY          Res staff or          Operators  
BUDGET, op & dev \$ 500,000  
FUNDED BY Govt. and Govt. Research Council

#### RESEARCH STAFF, not included above

USERS, in house          outside           
GRAD STUDENTS involved during year 15  
RES. BUDGET, in house \$ 400,000  
FUNDED BY Govt. and Govt. Res. Couns

#### FACILITIES FOR RESEARCH

SHIELDED AREA, fixed          m<sup>2</sup>  
movable          m<sup>2</sup>  
TARGET STATIONS          in          rooms  
STATIONS served at same time, max           
MAG SPECTROGRAPH, type           
COMPUTER, model           
OTHER FACILITIES           
          
          
        

#### REFERENCES/NOTES

#### MAGNET

POLE FACE diameter          cm; R extraction          cm  
GAP, min          cm; Field          kG } at          X 10<sup>6</sup>  
max          cm; Field          kG } ampere turns  
AVERAGE FIELD at R ext          kG  
CURRENT STABILITY          parts/10<sup>6</sup>; B<sub>max</sub>/⟨B⟩           
NUMBER OF SECTORS         ; SPIRAL, max          deg  
POLE FACE COIL PAIRS: AVF          /sec;  
Harmonic correction           
Rad grad          /sec or Circ coils           
WEIGHT: Fe          tons; Coils          tons  
CONDUCTOR, Material and type           
STORED ENERGY          MJ  
COOLING SYSTEM           
POWER: Main coils          max, kW  
Trimming coils          max, kW  
YOKE/POLE AREA          %  
SECTOR ANGLE (Sep Sec)          deg  
ION ENERGY (Bending limit) E/A =          q<sup>2</sup>/A<sup>2</sup> MeV  
(Focusing limit) E/A =          q/A MeV

#### ACCELERATION SYSTEM

DEES, number          angle          deg  
BEAM APERTURE          cm; DC BIAS          kV  
TUNED by, coarse          fine           
RF          to          MHz, stable ±          /10<sup>6</sup>  
Orb F          to          MHz; GAIN, max          kV/turn  
HARMONICS, RF/Orb F, used           
DEE-Gnd, max          kV, min gap          cm  
STABILITY, (pk-pk noise)/(pk RF volt)           
RF PHASE stable to ±          deg  
RF POWER input, max          kW  
RF PROTECT circuit, speed          μsec  
Type           
FREQUENCY MODULATION, rate          /sec  
MODULATOR, type           
BEAM PULSE, width         

#### VACUUM SYSTEM

PUMPS, No., Type, Size           
          
OPERATING PRESSURE          μTorr,  
PUMPDOWN TIME          hrs

#### ION SOURCES/INJECTION SYSTEM

#### EXTRACTION SYSTEM

#### CONTROL SYSTEM

## ENTRY NO. FM-7 (cont.)

## CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	15-200	
	d	25-100	
	$^3\text{He}$	75-280	
	$^4\text{He}$	25-200	
CURRENT		( $\mu\text{A}$ )	( $\mu\text{A}$ )
	Internal		
	p	$\leq 10$	
	d	$\leq 50$	
External	$^3\text{He}, ^4\text{He}$	$\leq 25$	
	p	$\leq 8$	
	d	40	
	$^3\text{He}, ^4\text{He}$	20	
Secondary		(part/s)	(part/s)

## BEAM PROPERTIES

	Measured	Conditions
Pulse Width	_____ RF deg _____ $\mu\text{A}$ of _____ MeV _____	
Phase Exc, max	_____ RF deg _____ $\mu\text{A}$ of _____ MeV _____	
Extract Eff	_____ % _____ $\mu\text{A}$ of _____ MeV _____	
Res, $\Delta E/E$	_____ % _____ $\mu\text{A}$ of _____ MeV _____	
Emittance		
(mm-mrad)	{ _____ axial } _____ $\mu\text{A}$ of _____ MeV _____	
	{ _____ radial }	

## OPERATING PROGRAMS, time dist

Basic Nuclear Physics	50	%
Solid State Physics		%
Bio-Medical Applications	30	%
Isotope Production	20	%
Development		%
		%
		%

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

The cyclotron is under reconstruction to a sectorfocussed machine. High energy protons and  $^3\text{He}$  particles will be accelerated with frequency modulation while isochronous operation will be possible for lower energies and for other particles. A new building for an enlarged experimental area is being projected.