

ENTRY NO. FM-14

NAME OF MACHINE Leningrad Synchrocyclotron
 INSTITUTION Leningrad Nuclear Physics Institute, Acad. of Sc. USSR
 LOCATION Gatchina, Leningrad District DATE May 1972 ***
188350 USSR
 IN CHARGE N.K. Abrosimov REPORTED BY N.K. Abrosimov

HISTORY AND STATUS

DESIGN, date _____ MODEL tests _____
 ENG. DESIGN, date _____
 CONSTRUCTION, date 1967
 FIRST BEAM date (or goal) Nov. 1967
 MAJOR ALTERATIONS _____
 OPERATION, I30 hr/wk; On Target _____ hr/wk
 TIME DIST., in house I00 %, outside _____ %
 USERS' SCHEDULING CYCLE 3 weeks
 COST, ACCELERATOR _____
 COST, FACILITY, total _____
 FUNDED BY _____

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS _____ ENGINEERS _____
 TECHNICIANS _____ CRAFTS _____
 ADMIN & CLER _____ TOTAL _____
 GRAD. STUDENTS involved during year _____
 OPERATED BY _____ Res staff or _____ Sp operators
 BUDGET, op & dev _____
 FUNDED BY _____

RESEARCH STAFF, not included above

USER GROUPS, in house _____ outside _____
 STAFF SCIENTISTS, in house _____ outside _____
 TOTAL RES STAFF, in house _____ outside _____
 GRAD STUDENTS involved during year _____
 RES. BUDGET, in house _____
 FUNDED BY _____

FACILITIES FOR RESEARCH PROGRAMS

SHIELDED AREA, fixed 2500 m²
 movable _____ m²
 TARGET STATIONS 9 in _____ ROOMS
 STATIONS SERVED AT THE SAME TIME, max 2
 MAG SPECTROGRAPH, type _____
 ON-LINE COMPUTER, model _____
 FACILITIES for:
 Isotope production _____
 Irradiation, Solid State _____
 Biological _____
 Time-of-Flight Study _____
 On-Line Mass Separation _____

NOTATIONS

MAGNET

POLE FACE dia 685 cm; R ext 316.5 cm
 GAP, min 39 cm; Field _____ kG
 max 50 cm; Field I9 kG } at I.2 10⁶
 AVE FIELD at R max I7.86 kG } A-turns
 CURRENT, STABILITY ± I00 parts/10⁶
 B max/ = I
 AVF SECTORS _____ SPIRAL, max _____ deg
 POLE FACE coil pairs, AVF _____ /sec
 Harmonic _____ /sec; Rad Grad _____ /sec, or
 _____ circular; HEAVY ION, E max = _____ q²/A
 WEIGHT, Fe 7800 ~~XXXX~~ AI I74 tons
 POWER, main coils I000, pole tips _____
 total I000 kW; cooled by _____
 YOKE/POLE area I28 %; θ sec (Sect Mag) _____ deg
 TOTAL POWER, installed 2 MW
 normal load I MW

ION SOURCE, int open with cold cathode
 ext _____

ACCELERATION SYSTEM

DEES, number I, width I80 deg
 BEAM APERTURE I0 cm; DC BIAS 3 kV
 TUNED by, coarse _____, fine _____
 RF 30.5 to I3.2 MHz, stable'± _____ /10⁶
 Orb F 28.9 to I3.2 Mc/s; GAIN I0 kV/t
 HARMONICS, RF/OF, used I
 DEE-Gnd, max I0 kV, x/field, min _____ cm,
 STABILITY, (pk-pk noise)/(pk RF volt) _____
 RF PHASE stable to ± _____ deg
 RF POWER input, max 240(per pulse) kW
 RF PROTECT curcuit, speed _____ μs
 type _____
 EXTRACT System Non-linear regenerat.
systeme

FREQUENCY MODULATION, rate 50 /sec
 MODULATOR, type Rotating capacitor
 BEAM PULSE, width micro 20 nsec
macro 0.3 msec

SELECTED REFERENCES

1. Proc. of the Intern. Conf. on High Ener. Acc. Yerevan 1969 V.1, P.317,349.
2. Sov. Jour. of Tech. Phys. V.40 p.2593, V.41 p.1222, V.41 p.1769 (1971)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	<u>P</u>	<u>1000</u>	<u>1000</u>
CURRENT		(μ A)	(μ A)
Internal	<u>P</u>		<u>0.64</u>
External	<u>P</u>		<u>0.16</u>
		(part/s)	(part/s)
Secondary	<u>π^-</u> <u>π^+</u>		<u>10^5</u> <u>10^6</u>
HEAVIEST ion			

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	<u>90</u> RF deg	<u>0.64</u> μ A of <u>1000</u> MeV
Phase Exc, max	<u>90</u> RF deg	<u>0.64</u> μ A of <u>1000</u> MeV
Extract Eff	<u>25</u> %	<u>0.64</u> μ A of <u>1000</u> MeV
Res, $\Delta E/E$	<u>1</u> %	<u>0.64</u> μ A of <u>1000</u> MeV
Emittance	{ axial } { (mm-mrad) radial }	<u>0.64</u> μ A of <u>1000</u> MeV
VACUUM norm	<u>2</u> μ orr	PUMPDOWN time <u>2</u> hr

OPERATING PROGRAMS, time dist

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

OTHER FEATURES and OPERATION SUMMARY

1. The proton beam is extracted by means of a wide aperture non-linear regenerative system. When the extraction system was designed, the spectrum of betatron oscillation present in machine was taken into account.
2. The proton beam may be stretched by means of cee-electrode system with the macro duty cycle 50-80% and efficiency 80-50%. Cee -60° azimuth, freq. range 13.4 to 13.2 MHz, 2.5 kV peak, one long wave type resonance system with a ferrite modulation, D.C. power - 2 kW.