ENTRY No. FM-9

NAME OF MACHINE Synchrocyclotron on 1GeV DATE March 1989

INSTITUTION Leningrad Nuclear Physics Institute Acad of Sc USSR

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TEL TELEX

IN CHARGE N.K.Abrosimov REPORTED BY

HISTORY AND STATUS

DESIGN, date Model tests

ENG DESIGN, date

CONSTRUCTION, date 1967

FIRST BEAM, date (or goal) Nov. 1967

MAJOR ALTERATIONS 1978

COST, ACCELERATOR

COST, FACILITY, total

FUNDED BY

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS

TECHNICIANS CRAFTS

GRAD STUDENTS involved during year

OPERATED BY Research staff or Operators

OPERATION 168 hr/wk, On target 168 hr/wk

TIME DISTR. in house 90 %, Outside 10 %

BUDGET, op & dev

FUNDED BY

RESEARCH STAFF, not included above

USERS, in house outside

GRAD STUDENTS involved during year

RESEARCH BUDGET, in house

FUNDED BY

MAGNET

POLE FACE, diameter (compact) 685 cm, R extraction 315 cm

R injection cm

GAP, min 39 cm, Field 19,3 kG
max 50 cm, Field kG
at 1,2 10^6 Ampere turns

AVERAGE FIELD at R ext 17,9 kG

B max/ <B>

NUMBER OF SECTORS compact / separated Spiral, max deg

SECTOR ANGLE (SSC) deg

TRIMMING COILS

CONDUCTOR, material and type Al

STORED ENERGY (cryogenic) MJ

POWER : main coils 1000 max, kW ; current stability $2 \cdot 10^{-5}$

trimming coils max, kW ; current stability

WEIGHT : Fe 7800 tons ; coils 174 tons

COOLING system Water cooling

ION ENERGY (bending limit) E/A = 1000 q^2/a^2 MeV/amu

(focusing limit) E/A = 1000 q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number 1 12 ; angle 180-150 deg

BEAM APERTURE cm ; DC Bias 2 - 3 kV

TUNED by, coarse fine

RF 29,8 to 13,3 mHz, stable ±

Orb F 29,5 to 13,35 mHz

HARMONICS, RF/Orb F, used 1

DEE - Gnd, max 13-7 kV, min gap cm

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

ENERGY GAIN, max 10 - 5 kV/turn

RF PHASE, stable to ± deg

RF POWER input, max 200 (per pulse) kW

FREQUENCY MODULATION, rate 50 /s

modulator, type Rotating capasitor

beam pulse, width micro 10 ns macro-0,3ms

VACUUM SYSTEM

OPERATING PRESSURE $2 \cdot 10^{-6}$ Torr Torr or mbar

PUMPS, No, Type, Size 2 diffusion pumps on 40000 l/s

ION SOURCES

open with cold cathode

INJECTION SYSTEM

EXTRACTION SYSTEM

Non-linear regenerative systeme

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 2500 m² ; movable m²

TARGET STATIONS 9 in 4 rooms

STATIONS served at same time, max 2

MAG SPECTROGRAPH, type

COMPUTER model EC 10-46

OTHER FACILITIES Time-of-Flight Study, Isotope Production Proton therapy, Solid State

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p		1000	3 A	1 A

SECONDARY (part/s)

π^+ - 1.6 10^7, π^- - 5 10^6

μ^+ - 3 10^5, μ^- - 1 10^5, "n" on target 3 10^{14}

BEAM PROPERTIES

	MEASURED		CONDITIONS		
PULSE WIDTH	50	RF deg	pμ A of	MeV	ions
PHASE EXC, max		RF deg	pμ A of	MeV	ions
EXTRACT eff	30	%	pμ A of	MeV	ions
RESOL ΔE/E	1	%	pμ A of	MeV	ions

EMITTANCE

(π mm. mrad) axial / rad pμA of MeV ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 50% SOLID STATES PHYSICS 30%

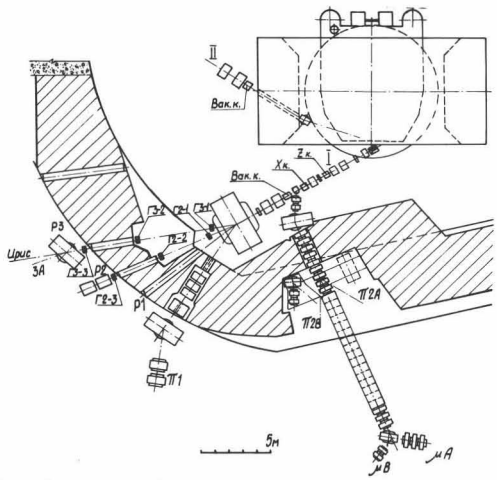
BIOMEDICAL APPLICAT. 7% ISOTOPE PRODUCTIONS 3%

Other Works - 10%

REFERENCES/NOTES

1. Sov. Jour. of Tech.Phys., v.40 p.2593, v.41 p.1222, v.41 p.1769 (1971)
2. Proc. of the VII All-Union Conf. on Charged Particle Accelerators, v.2, p.75 (1980)

PLAN VIEW



COMMENTS

1. The proton beam may be stretched with macro duty-cycle 60% and efficiency 80%.
2. For short pulse neutron beam production the fast kicking of the proton beam.is made.