

ENTRY NO. 15

NAME OF MACHINE INR Cyclotron  
 INSTITUTION Institute of Nuclear Research, Academia Sinica, Shanghai  
 ADDRESS Shanghai, China  
 TEL 950998 TELEX  
 IN CHARGE \_\_\_\_\_ REPORTED BY Hong-jun Chang

HISTORY AND STATUS 1.2M classical cycl. to SFC

DESIGN, date \_\_\_\_\_ Model tests \_\_\_\_\_  
 ENG DESIGN, date 1978-1979  
 CONSTRUCTION, date 1980-1982  
 FIRST BEAM, date (or goal) Nov. 1983  
 MAJOR ALTERATIONS \_\_\_\_\_

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 \_\_\_\_\_ hr/wk. On target \_\_\_\_\_ hr/wk  
 TIME DISTR, in house \_\_\_\_\_ %, outside \_\_\_\_\_ %

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) 138 cm, R-extraction \_\_\_\_\_ cm  
 R injection \_\_\_\_\_ cm

GAP, min 146 cm, Field 17.5 kG  
 max 224 cm, Field 11.7 kG at 0.3 x 10<sup>6</sup>

AVERAGE FIELD at R ext 14.6 kG Ampere turns  
 B max/ < B > \_\_\_\_\_

NUMBER OF SECTORS {compact 3 } Spiral, max 45 deg  
 {separated \_\_\_\_\_}

SECTOR ANGLE (SSC) \_\_\_\_\_ deg  
 TRIMMING COILS 9 pairs

CONDUCTOR, material and type mineral insulated cable  
 STORED ENERGY (cryogenic) \_\_\_\_\_ MJ

POWER: main coils 80 max kW: current stability 5x 10<sup>-5</sup>  
 trimming coils 10 max kW: current stability 1x 10<sup>-4</sup>

WEIGHT: Fe 120 tons: coils \_\_\_\_\_ tons  
 COOLING system deminerlized water

ION ENERGY (Bending limit) E/A = 32 q<sup>2</sup>/A<sup>2</sup> MeV/amu  
 (Focusing limit) E/A = 30 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 1x180 angle \_\_\_\_\_ deg  
 BEAM APERTURE 3 cm; DC Bias \_\_\_\_\_ kV

TUNED by, coarse short plate fine var. cap.  
 RF 10 to 22 MHz, stable ± 1x 10<sup>-6</sup>

Orb F \_\_\_\_\_ to \_\_\_\_\_ MHz  
 HARMONICS, RF/Orb F, used 3

DEE-Gnd, max 70 kV, min gap 34.5 cm  
 STABILITY, (pk-pk noise)/(pk RF volt) 5x10<sup>-3</sup>

ENERGY GAIN, max 1.40 kV/turn  
 RF PHASE, stable to ± \_\_\_\_\_ deg

RF POWER input, max. 100 kW  
 FREQUENCY MODULATION, rate \_\_\_\_\_ /s

modulator, type \_\_\_\_\_  
 beam pulse, width \_\_\_\_\_

VACUUM SYSTEM

OPERATING PRESSURE 1.5x10<sup>-5</sup> Torr or mbar  
 PUMPS, No, Type, Size 2x1250 l/s oil diff.

ION SOURCES

..... PIG type (internal only)

INJECTION SYSTEM

EXTRACTION SYSTEM 2 sections of electrostatic defl.  
+ Foc. Mag. Channel + Mag. Weak. Channel

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 \_\_\_\_\_

CHARACTERISTIC BEAMS

| PARTICLE | ENERGY (MeV) |              | CURRENT (µA) |           |
|----------|--------------|--------------|--------------|-----------|
|          | Goal         | Achieved     | Internal     | External  |
| p        | <u>10-30</u> | <u>10-30</u> |              | <u>30</u> |
| d        | <u>10-16</u> | <u>20</u>    |              |           |
| α        | <u>20-32</u> | <u>40</u>    |              |           |

SECONDARY \_\_\_\_\_ (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS  
 PULSE WIDTH \_\_\_\_\_ RF deg \_\_\_\_\_ µA of \_\_\_\_\_ MeV \_\_\_\_\_ ions  
 PHASE EXC. max \_\_\_\_\_ RF deg \_\_\_\_\_ µA of \_\_\_\_\_ MeV \_\_\_\_\_ ions  
 EXTRACTION eff 50-80 \_\_\_\_\_ µA of 10-30 MeV \_\_\_\_\_ ions  
 RESOL ΔE/E 0.43 % 50nA ~~µA~~ of 1.5-30 MeV \_\_\_\_\_ ions  
 EMITTANCE -0.7  
 (π mm-mrad) \_\_\_\_\_ axial \_\_\_\_\_ µA of \_\_\_\_\_ MeV \_\_\_\_\_  
 \_\_\_\_\_ rad

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS \_\_\_\_\_ SOLID STATES PHYSICS \_\_\_\_\_  
 BIOMEDICAL APPLICAT. \_\_\_\_\_ ISOTOPE PRODUCTIONS \_\_\_\_\_

REFERENCES/NOTES

- 1)
- 2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.