Entry: C64 **Date**: 12 June 1998

Machine Name: 88 Inch Cyclotron **Institution**: Lawrence Bekelely National Laboratory

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HISTORY

Design by: 1958

Construction time: 1959–1962

First beam: External 1962

CHARACTERISTIC BEAMS

ions / energy (MeV/n) **/ current** (pps) **/ power** (W) :

- P	1–55	1.6×10^{14}	1300
- $^{16}O^{6+}$	10	2.2×10^{13}	560
- $^{86}Kr^{19+}$	6.1	1.9×10^{12}	150
- U^{47+}	4.5	1.9×10^{9}	

transmission efficiency (total)

- **typical**: 10 %- **best**: 25 %

transverse emittance (rms)

- **vertical**: 3 π mmmrad
- **horizontal**:: 4 π mmmrad

longitudinal emittance (rms) 0.1 ΔE/E.deg RF

USES

basic research: 74% **therapy**: %

development: 2% **isotope production**: %

other applications: 12% **maintenance**: 4%

beam tuning: 8%

total time: 7212 h/year

TECHNICAL DATA

a) magnet

type: Compact Sector Focussed

Kb: 160 MeV/A **Kf**: 70 MeV/A

average field (min-max): – 1.8 T

number of magnet sectors: 3

- **angle**: 60 deg
- **spiral (max)**: 55 deg

pole parameters

- **diameter**: 2.24 m
- **injection radius**: 0 m
- **extraction radius**: 1.0 m

hill gap: 0.19 m **valley gap**: 0.30 m

field trimming

- **trim coils**
  - **number**: 17
  - **current (max)**: 2000 A
- **harmonic coils**
  - **number**: 5
  - **current (max)**: 200 A
- **others**
  - **number**:
  - **current (max)**: A

main coils:

- **number**: 1 pair
- **Ampere-turns**: 6×10^5 A.T.
- **current**: 3000 A

stored energy: MJ

weight : - **iron**: 260 t - **coils**: 9 t

power

- **main coils (total)**: 450 kW
- **trim coils (total max)**: 580 kW
- **refrigerator (cryogenic)**: kW

b) RF

- **acceleration**
  - **frequency range**: 5.5 – 16.2 MHz
  - **harmonic modes**: 1,3 , 5,7
  - **number of dees**: 1
  - **angular aperture**: 180 deg
  - **voltage:- average (min-max)**: 50 kV
    - **variation with radius**: none
    -
  - **power in (max)**: 300 kW
  - **stability: - phase**: deg - **voltage**: 0.1 %

- **other cavities**
  - **purpose**:
  - **frequency range**: MHz
  - **region of influence**: m
  - **voltage (max)**: kV
  - **power in (max)**: kW
  - **stability:- phase**: deg - **voltage**: %

c) injection

- **internal source**:
- **external (radial/axial)**: axial
  - **elements**: 90° gridded mirror
  - **source voltage**: 10 – 15 kV
  - **injection energy**: .001 – .010 MeV/n
  - **buncher**: 1st and 2nd harmonic
- **injection efficiency**: 50 %

d) ion sources/injector

ECR and AECR-U

e) extraction

- **elements, characteristics:**
  - 3 element, electrostatic
  -
  -
  -
- **efficiency**
  - **typical**: 60 % - **best**: 70 %

f) vacuum

- **pumps**: 2-36" diffusion pumps
  2 Cryopanels, 2 Cryopump
- **achieved vacuum**: 9.3×10^{-5} Pa

REFERENCES

Proc. 14th International Conference Cyclotron and Applications page 173, and Proc. this conference

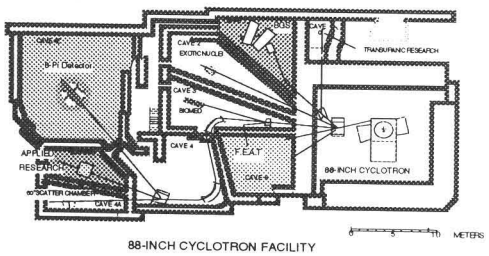
EXPERIMENTAL FACILITIES

BGS Berkeley Gas-filled Separator

FEAT Facility for Exotic Atom Trapping

8-Pi Gamma Ray Spertrometer

PLAN VIEW OF FACILITY



88-INCH CYCLOTRON FACILITY

COMMENTS