

**ENTRY NO:** FM-2  
**Machine Name:** Synchrocyclotron on 1 GeV  
**Date:** 7/5/01 3:57:47 AM  
**Institution:** PNPI RAS, Russia  
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#### HISTORY

**Designed By:** Efremov Institute  
**Construction Dates:** 1959-1965  
**First Beam Date:** November 1967

#### CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
p+	1000	$6 \cdot 10^{12}$	
pi(+,-)	150	$10^6 - 1.6 \cdot 10^7$	
mu(+,-)	90	$10^5 - 3 \cdot 10^5$	
mu+	4	$3 \cdot 10^4$	

#### transmission efficiency(source to extract beam)

**typical:** % - **best:** %

#### tranverse emittance

##### emittance definition:

**vertical:**  $\pi$  mm mrad

**horizontal:**  $\pi$  mm mrad

**longitudinal:** ( $\Delta$ ) E/E) %xdeg RF

#### USES

<b>basic research:</b> 90%	<b>therapy:</b> 5%
<b>development:</b> %	<b>isotope production:</b> %
<b>other:</b> 5%	<b>maintenance:</b> %
<b>beam tuning:</b> %	<b>Total Time:</b> 2000h/year

#### TECHNICAL DATA

**a)magnet:** type: E-9

**Kb:** MeV/A **Kf:** MeV/A

**average field (min/max):** 1.9 T

**number of magnet sectors:**

**hill angular width:** hill angular width

**spiral (max):** deg

**pole parameters**

**diameter:** 6.85 m

**injection radius:** m

**extraction radius:** 3.15 m

**hill gap:** 0.39m **valley gap:** m

**trim coils**

-number: x2

-current(max): A-turns

**harmonic coils**

-number: xNsectorsx2

-current(max): A-turns

**main coils**

**number:** 132x2

**total ampere-turns:**  $1.3 \cdot 10^6$  A-turns

**current:** 4800 A

**stored energy:** MJ

**weight - iron:** 7800t **coils:** 120t

**power**

**main coils (total):** 1000 kW

**trim coils (total max):** 20 kW

**refrigerator (cryogenic):** kW

**b)RF**

**acceleration**

**frequency range:** 29-13.3MHz

**harmonic modes:** 1  
**number of dees:** 1  
**number of cavities:**  
**dee angular width:** 180degrees  
**voltage**  
at injection: kV(peak to ground, max)  
at extraction: kV(peak to ground, max)  
peak: kV(peak to ground, max)

**line power(max):** kW

**stability**

**phase:** deg

**voltage:** %

**injection**

**c)ion source:** open,with cold cathod

**external injection:**

**components:**

**source bias voltage:** kV

**injection energy:** MeV/N

**buncher:**

**injection efficiency:** %

**d)injector:**

**e)extraction**

non-linear regenerativ system

**efficiency**

**typical:** 30%

**best:** %

**f)vacuum**

**pumps:** 2 diffusion pumps

**achieved vacuum:**  $0.26 \cdot 10^{-6}$  Pa

#### REFERENCES

Proc. of the All-Union Conf. on Charg. Partic. Accel. v2,  
p.75, 1980

#### EXPERIMENTAL FACILITIES

#### COMMENTS