

ENTRY NO. CBI Date 21. August 1995  
 Name of Machine Cooler Synchrotron COSY-Jülich  
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**HISTORY**

MILESTONE DATES:  
 Design 1985 Model Tests 1990-1992  
 Construction 1987-1992 First Beam 1993  
 DESIGN/CONSTRUCTION BY:  
 in house Yes other Various Fabrication Vendors  
 COST: Accelerator DM 100 x 10<sup>6</sup> Facility  
 FUNDED BY: Federal Government BMBF and State of Northrhine-Westfalia (MWF)

**STATUS**

STAFF: Machine  
 Scientists Engineers  
 Technicians Students  
 Research (in house/external)  
 Scientists / Engineers /  
 Technicians / Students /  
 BUDGET: Machine Funded by  
 Research Funded by  
 TIME DISTRIBUTION:  
 Basic Research (in house/external) % / %  
 Applied Program (in house/external) % / %  
 Maintenance % Development %

**MAIN PARAMETERS**

MACHINE TYPE: Synchrotron and Storage ring  
 ION TYPES: p ENERGY: 40-2500 MeV/u  
 RING: Geometry racetrack 6 fold Circumference 184 m syn.

**INJECTED BEAM CHARACTERISTICS**

PARAMETERS: Injected Ions H<sup>+</sup>  
 Energy 40 MeV/u Ions/bunch 7.5 x 10<sup>5</sup>  
 EMITTANCE: h 2.5 π mm mrad v 5 π mm mrad  
 ΔE/E 0.3 % Bunch length 2 nsec  
 TIMING: Bunch freq 28 MHz Filling Time sec  
 INJECTION METHOD: Stripping Injection

**MAGNET SYSTEM**

LATTICE: Focusing Type separated function  
 Focusing Order FDDF or DFFD  
 Betatron Freq: v<sub>h</sub> 3.6 v<sub>v</sub> 3.6  
 No. Short Straight Sections Length m  
 No. Long Straight Sections 2 Length 40 m  
 BENDING MAGNETS: No. 24 Length (ea) 1.755 m  
 Field: max 1.58 T  
 QUADRUPOLES: No. 56 Length (ea) 0.3/0.57 m  
 Gradient: max 7.6 T/m  
 OTHER MAGNETS: 18 sextupoles 3.0 T/m<sup>2</sup>

**RF SYSTEM**

CAVITIES: No. 1 Type symmetric re-entrant  
 RF FREQ 0.462-1.572 MHz HARMONIC f<sub>rf</sub>/f<sub>ion</sub> 1  
 PEAK VOLTS/CAV at 100% duty cycle 5x10<sup>-3</sup> MV  
 PEAK POWER/CAV 56x10<sup>-3</sup> MW

**VACUUM SYSTEM**

VACUUM CHAMBER: Material stainless steel  
 Aperture 15 x 6 cm<sup>2</sup>  
 PUMPS: (No., Type, Speed) 80 120 l/s ions  
 120 1,500 l/s sublimation  
 PRESSURE: 10<sup>-10</sup> - 10<sup>-11</sup> Torr

**EXTRACTION SYSTEM**

TYPE: (a) third order resonance  
 (b) with ultra slow extraction system  
 (c)  
 LENGTH OF SPILL: (a) 0.01 - 10 sec  
 (b) 5-1000 sec  
 (c) sec

**CHARACTERISTIC BEAMS**

	Ion	E/A (MeV/u)	Ions/pulse	ΔE/E (%)
(a)	p	≤ 2500	≤ 2x10 <sup>10</sup>	0.1
(b)				
(c)				
(d)				

**EXTRACTED BEAM PROPERTIES:**

Rep. Rate (pulse/sec) ≤ 0.3  
 $\epsilon_n = \beta\gamma\epsilon$  h 8.8π mm mrad for μA of .2500 MeV/u .p. ions  
 v 8.8π mm mrad for μA of .2500 MeV/u .p. ions

**FACILITIES FOR RESEARCH**

SHIELDED AREA: Fixed: m<sup>2</sup> Moveable m<sup>2</sup>  
 Target Stations: No. Served At Same Time:  
 MAGNETIC SPECTROMETERS:  
 OTHER FACILITIES:  
 1) three internal target areas (TP1 - TP3)  
 2) magnetic spectrometer BIG KARL  
 time of flight spectrometer, TOF

**REFERENCES / NOTES**

(a)  
 (b)

**OTHER RELEVANT PARAMETERS, RECENT IMPROVEMENTS, ETC.**

Electron cooling up to 200 MeV/u  
 Stochastic cooling at energies between 1000 and 2500 MeV/u

**PLAN VIEW OF FACILITY, COMMENTS**

