

ENTRY NO. CBI Date  
 Name of Machine Cooler Synchrotron COSY-Jülich  
 Institution Forschungszentrum Jülich GmbH (KFA)  
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 In Charge: Reported by: R. Maier

**HISTORY**  
 MILESTONE DATES:  
 Design 1985 Model Tests 1990 - 1992  
 Construction 1987 - 1992 First Beam  
 DESIGN/CONSTRUCTION BY:  
 in house other  
 COST: Accelerator Facility  
 FUNDED BY:

**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 syn-Circumference 184 m

**INJECTED BEAM CHARACTERISTICS**  
 PARAMETERS: Injected Ions  $H^+$   
 Energy 40 MeV/u Ions/bunch  $7.5 \cdot 10^5$   
 EMITTANCE:  $\epsilon_x$  2.5  $\pi$ mm mrad  $\epsilon_y$  5  $\pi$ mm mrad  
 $\Delta E/E$  % Bunch length nsec  
 TIMING: Bunch freq MHz Filling Time sec  
 INJECTION METHOD: Stripping injection

**MAGNET SYSTEM**  
 LATTICE: Focusing Type separated function  
 Focusing Order FDDF or DFFD  
 Betatron Freq:  $\nu_x$  3.38  $\nu_y$  3.38  
 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 30 T/m

**RF SYSTEM**  
 CAVITIES: No. 1 Type symmetric re-entrant  
 RF FREQ 0.462-1.572 MHz HARMONIC  $f_r/f_{ion}$  1  
 VOLTS/CAV(max) at 100% duty cycle  $5 \cdot 10^7$  MV  
 POWER/CAV(max)  $56 \cdot 10^3$  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 1500 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	$\Delta E/E$ (%)
(a)	p	$\leq 2500$	$\leq 2 \cdot 10^{11}$	$1 \cdot 10^{-3}$
(b)				
(c)				
(d)				

**EXTRACTED BEAM PROPERTIES:**  
 Rep. Rate (pulse/sec)  $\leq 0.3$   
 $\epsilon_n = \beta \gamma \epsilon$   $\epsilon_x$  8.8  $\pi$ mm mrad for  $\mu A$  of 2500 MeV/u p... ions  
 $\epsilon_y$  8.8  $\pi$ mm mrad for  $\mu A$  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:  
 magnetic spectrometer BIG KARL, time of flight spectrometer TOF, three internal target areas (TP1-TP3)

**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

