

ENTRY NO. C19 Date June 1992  
 Name of Machine VICKSI (Van-de-Graaff Isochron Cyclotron Kombination für Schwere Ionen)  
 Institution Hahn-Meitner-Institut  
 Address Glienicker Straße 100, W-1000 Berlin 39, Germany  
 Tel 30/80 09 2415 Telex 01/85763 Fax 30/80 09 2097 EMAIL HOMEYER@VAX.HMI.DBP.DE  
 In Charge: H. Homeyer Reported by: W. Pelzer

**HISTORY**  
 MILESTONE DATES:  
 Design 1973-74 Model Tests 1973-74  
 Construction 1974-76 First Beam June 1977  
 DESIGN/CONSTRUCTION BY:  
 in house yes, and other like Scanditronix, Danfysik  
 COST: Accelerator 36 Million DM Facility 56 Million DM  
 FUNDED BY: FRG (90%) + Berlin (10%)

**STATUS**  
 STAFF: Machine (Cyclotron plus 2 electrostatic injectors)  
 Scientists 5 Engineers 7  
 Technicians 15 Students -  
 Research (in house/external)  
 Scientists 36 / 120 Engineers 2 / -  
 Technicians 7 / - Students 33 / 60  
 BUDGET: Machine 2.5 Million DM Funded by FRG (90%) + Berlin (10%)  
 Research 2.5 Million DM Funded by Berlin (10%)  
 TIME DISTRIBUTION: (100%=7000 h operating time per year)  
 Basic Research (in house/external) 40 % / 40 %  
 Applied Program (in house/external) - % / - %  
 Development + set up 12 % Maintenance 8 %

**MAGNET**  
 POLE PARAMETERS:  
 Diameter 171 cm R<sub>extract</sub> 171 cm R<sub>inject</sub> 43 cm  
 HILL PARAMETERS: Gap (min) 6 cm B<sub>max</sub> 1.57 T  
 (0 AT) Gap (max) cm B<sub>min</sub> T  
 VALLEY PARAMETERS: Gap (min) cm B<sub>max</sub> T  
 (0 AT) Gap (max) open cm B<sub>min</sub> <0.1 T  
 AVERAGE FIELD: < B ><sub>min</sub> T < B ><sub>max</sub> 0.89 T  
 NUMBER OF SECTORS: compact/separated - / 4  
 sector angle 50 deg. spiral (max) 0 deg.  
 FIELD TRIMMING: Trim Coils 12  
 Harmonic Coils 3 (of the 12)  
 Other -  
 CURRENT: Main Coils 2000 Amps Stability 2 · 10<sup>-5</sup>  
 Trim Coils 150 Amps Stability -  
 Stored Energy (cryogenic) MJ  
 WEIGHT: Iron 360 tons Conductor 6 tons  
 ION ENERGY: Bending Limit E/A = 130 q<sup>2</sup>/A<sup>2</sup> MeV/u  
 Focussing Limit E/A = q/A MeV/u

**ACCELERATION SYSTEM**  
 FUNDAMENTAL ACCELERATION: 0°/180°-operation  
 Description: Two λ/4-resonators in opposite magnet valleys,  
 No. of Gaps/turn 4 dE/dn(max) 0.56 MeV/q  
 Voltage(max) 0.14 MV Harmonic f<sub>rf</sub>/f<sub>ion</sub> 2 to 7  
 Freq. 10 to 20 MHz Power in(max) per cavity 0.02 MW  
 Stability: Phase <0.05° Voltage <10<sup>-3</sup>  
 OTHER CAVITIES (Flattopping or otherwise):  
 Description: none  
 Region of Influence: R<sub>min</sub> cm R<sub>max</sub> cm  
 No. of Gaps/turn dE/dn(max) MeV/q  
 Voltage(max) MV Harmonic f<sub>rf</sub>/f<sub>ion</sub>  
 Freq. MHz Power in(max) MW  
 Stability: Phase Voltage

**VACUUM SYSTEM**  
 OPERATING PRESSURE: 1 x 10<sup>-7</sup> bar  
 PUMPS: No. and type 2 cryopumps 10000 l/sec  
 2 turbopumps 1450 l/sec

**ION SOURCE(S)**  
 Type Intensity (mA) ε<sub>n</sub> = βγc (πmm mrad) Ion Species  
 (a) Axial Penning Source in 6 MV Van-de-Graaff  
 (b) Sputter Source for 8 MV Tandem Injector  
 (c) Stripper between injectors and cyclotron  
 (d) 1 ≤ A ≤ 129; 1 ≤ q/A ≤ 1/8

**INJECTION SYSTEM** radial inflectors,  
 2 magnetic + 1 electrostatic Efficiency 70 %

**EXTRACTION SYSTEM** radial deflectors,  
 1 electrostatic, 2 magnetic channels Efficiency 100 %

**CHARACTERISTIC BEAMS**

Accelerated Ions	E/A (MeV/u)	Current(part μA)	
		Internal	External
(a) <sup>12</sup> C	4 - 32	1.0	0.1
(b) <sup>36</sup> Ar	1.3 - 13	1.0	0.001
(c) <sup>58</sup> Ni	3.4 - 14.5	0.01	0.001

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

**EXTRACTED BEAM PROPERTIES:**  
 For <sup>0.5</sup>p μA of 7.5 MeV/u 20 Ne ions  
 ΔE/E 0.1 % Δφ ±3 (<1 ns) °rf  
 ε<sub>n</sub> = βγc x 6 πmm mrad z 5 πmm mrad

**FACILITIES FOR RESEARCH**  
 SHIELDED AREA: Fixed 800 m<sup>2</sup> Moveable - m<sup>2</sup>  
 Target Stations: 23 No. Served At Same Time: 2  
 MAGNETIC SPECTROMETERS: Q3D  
 OTHER FACILITIES: - beams of the 6 MV Van-de-Graaff  
 available in parallel to these of the tandem/cyclotron  
 combination. - external pulsing gives 1 ns beam  
 pulses with 100 ns repetition down to one shot operation.

**REFERENCES/NOTES**  
 (a) IEEE Vol. NS-26/2, 79, p.1872,2300,2209,2355,2202  
 (b) Proc.10th Int. Conf. on Cycl. and Appl., 1984, 230

