

ENTRY NO. **C23** Date September 1995  
 Name of Machine VICKSI (Van-de-Graaff Isochron CycTotron Kombination für Schwere Ionen)  
 Institution Hahn-Meitner-Institut Berlin  
 Address Glienicker Straße 100, D-14109 Berlin, Germany  
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 In Charge: H. Homeyer Reported by: H. Homeyer

**HISTORY**  
 MILESTONE DATES:  
 Design 1973-74 Model Tests 1973-74  
 Construction 1974-76 First Beam June 1977  
 DESIGN/CONSTRUCTION BY:  
 in house partly other Scanditronix AB, Uppsala  
 COST: Accelerator 40 MDM Facility 56 Million DM  
 FUNDED BY: Federal (90%), State (10%)

**STATUS**  
 STAFF: Machine 4 Scientists 6 Technicians 30  
 Engineers 7 Students 6  
 Research (in house/external) 30 / 60  
 BUDGET: Machine 2.5 MDM Research 1.0 MDM  
 Funded by Federal 90% State 10% BMW  
 TIME DISTRIBUTION:  
 Basic Research (in house/external) 30 % / 25 %  
 Applied Program (in house/external) 10 % / 15 %  
 Maintenance 10 % Development 10 %

**MAGNET**  
 POLE PARAMETERS:  
 Diameter 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  
 (@ AT) Gap (max) 6 cm B<sub>min</sub> T  
 VALLEY PARAMETERS: Gap (min) open cm B<sub>max</sub> <0.1 T  
 (@ AT) Gap (max) cm B<sub>min</sub> 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  
 Harmonic Coils 4  
 Other  
 CURRENT: Main Coils 2000 Amps Stability 10<sup>-5</sup>  
 Trim Coils 50 Amps Stability 10<sup>-4</sup>  
 Stored Energy (cryogenic) MJ  
 WEIGHT: Iron 300 tons Conductor  
 ION ENERGY: Bending Limit E/A = 130 q<sup>2</sup>/A<sup>2</sup> MeV/u  
 Focusing Limit E/A = q/A MeV/u

**ACCELERATION SYSTEM** 0°/180°-operation  
 FUNDAMENTAL ACCELERATION: magnet valleys,  
 Description: 2 Quarterwave Resonators (30°) in opposite  
 No. of Gaps/turn dE/dn(max) 0.56 turn MeV/q  
 Voltage (max) 0.14 MV Harmonic f<sub>n</sub>/f<sub>ion</sub> 2-8  
 Freq 10-20 MHz Power in(max) 0.02 per cavity MW  
 Stability: Phase <0.1 deg. 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>n</sub>/f<sub>ion</sub>  
 Freq MHz Power in(max) MW  
 Stability: Phase Voltage

**VACUUM SYSTEM**  
 OPERATING PRESSURE: 5 x 10<sup>-8</sup> mbar  
 PUMPS: (No. and type) 1 Turbopump 1500 l/sec  
 2 Cryopumps 10000 l/sec

**ION SOURCE(S)**  
 Type Intensity @ ε<sub>n</sub> = βγε Ion Species  
 (a) 5.0 GHz ECR on CN-injector terminal (mA) (π mm mrad)  
 (b) 14 GHz ECR + RFQ (1996)  
 (c)  
 (d)

**INJECTION SYSTEM**  
 radial, 2 magnetic, 1 electro- Efficiency 70 %  
 static deflectors

**EXTRACTION SYSTEM**  
 electrostatic deflector, current Efficiency 100 %  
 septum magnet

**CHARACTERISTIC BEAMS**  
 Accelerated Ions E/A (MeV/u) Current (part μA)  
 Internal External  
 (a) 12C 72 0.5  
 (b) 40Ar 4 - 32 0.5 - 0.01  
 (c) 129Xe 1.3 - 13 0.1 - 0.001  
 (d) 2.0 - 4.5 0.01 - 0.001

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

**EXTRACTED BEAM PROPERTIES:**  
 For 0.5 p μA of 7.5 MeV/u 20 Ne ions  
 ΔE/E 0.1 % Δφ ±3 °rf  
 ε<sub>n</sub> = βγε x 6 π mm mrad z 5 π mm mrad

**FACILITIES FOR RESEARCH**  
 SHIELDED AREA: Fixed: 800 m<sup>2</sup> Moveable m<sup>2</sup>  
 Target Stations: 13 No. Served At Same Time: 1  
 MAGNETIC SPECTROMETERS: 330  
 OTHER FACILITIES: beams of the CN-Van-de-Graaff injector  
 available at additional 3 low energy targets - external  
 pulsing gives 1 ns beam pulses with 100 ns repetition  
 down to one shot operation.

**REFERENCES/NOTES**  
 (a) IEEE NS-26/2, 79, p.1872, 2300, 2209, 2355, 2202  
 (b) P. Arndt et al., NIM B89 (1994) 14-16

**PLAN VIEW OF FACILITY, COMMENTS**  
 - new RFQ injector under construction  
 - eye cancer therapy project under construction

