

SIS18 Status Report

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In the frame of a dedicated machine development run with N-ions, operation with high space charge tune shift was demonstrated. About 10^{11} N-ions could be injected leading to an incoherent tune shift of up to $dQ_v = -0.2$. By means of the new residual gas profile monitor, fast emittance blow-up was observed during the transition from the high current working point to the working point required for slow extraction.

Since the incoherent tune shift is getting more often an origin for beam losses at high current operation, the resonance diagram was subject of a number of machine experiments. A scanning method to determine strength and location of the resonances was developed. Several scans of the tune diagram around the standard working point have been performed [1].

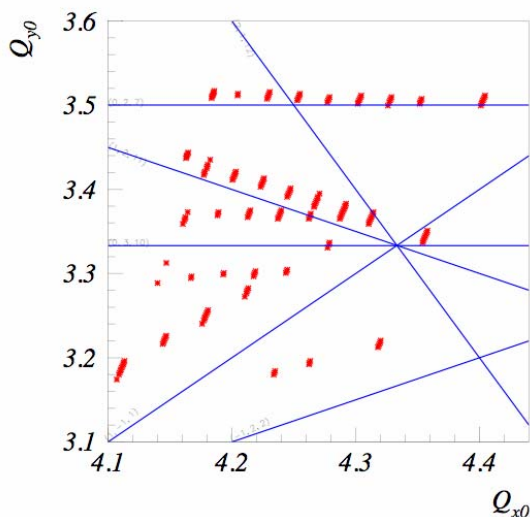


Figure 1: Resonance diagram of the SIS18. The lines mark the theoretical predictions and the dots indicate measured beam loss.

The installation of the set of new correction multipoles could be finished in 2004. Based on systematic resonance investigations, the correction coils will be applied to compensate the most relevant and limiting resonances.

In this context measurements on the influence of a longitudinal motion in an Rf bucket on the beam losses at high current operation were performed. First indications for enhanced losses caused by a trapping in resonances after Rf bunching were obtained. Since such phenomena may have an important impact on the SIS100 design, accompanying code developments and simulations are being conducted.

Due to a not optimal design of the high voltage frame of the residual gas profile monitor an asymmetric noise offset was generated a maximum voltage. The design of the high voltage frame was changed and the relevant components

were replaced during a shut down. During a number of following machine experiments the new monitor was successfully commissioned and its capability for precise time resolved beam profile measurement was demonstrated.

A number of experiments requesting slow extraction suffered from a not satisfying microstructure at slow extraction during high intensity operation. The usual measures for smoothing the spill structure did not provide the required conditions. As a first step a system for a precise time structure analysis has been planned and will be taken into operation in 2005. Based on this system options for optimizations of the micro structure will be developed.

Machine experiments were performed with the goal to demonstrate the function of the new collimator concept realized in section S12. The residual gas pressure observed under the influence of the installed cryo pump and desorption gases from stopped beam on the collimator.

The design of the new bunch compression cavities was finished. The supply unit for the final amplifier was ordered and tested. The choice of the magnetic alloy core materials for the cavities has been made and cores for two Rf gaps were ordered. The final concept is to build two separate Rf compression systems, one equipped with amorphous and one equipped with nanocrystalline core material. The call for tender for the manufacturing of the first Rf compression system was carried out and the components were ordered.

The development of a new valve control was finished. The new system was installed and successfully commissioned.

A fail function of the high voltage supply unit of the electrostatic extraction septum caused a fire in the SIS tunnel. The soot and dust covered most of the accelerator components and the infrastructure in the SIS. With the help of external, specialized companies the synchrotron and most of the infrastructure had to be cleaned in two cleaning cycles.

References

- [1] G. Franchetti, B. Franczak, and P. Schütt, GSI Note GSI-Acc-Note-2004-05-001