

## UA9 Simulations Meeting, 3 June 2009

Participants: Gianluca Cavoto, Said Hasan, Jim Spencer, Tom Markiewicz, Robert Noble

### 1. R. Noble, J. Spencer: Preliminary results for nuclear interaction modeling in Crystal-Particle Interactions WG

Bob Noble described the status of the nuclear interaction modeling work in WG-3. The aim is to provide compact probability formulas for Said Hasan's crystal emulator "CRYM". Noble and Spencer have made first estimates of the rms scattering angles and mean-free paths (interaction lengths) for the nuclear elastic (p+Nucleus -> p+Nucleus) and nuclear quasi-elastic processes (p+Nucleus -> p+Nucleus\*, where  $\Delta E < \text{pion mass}$ ) using invariant cross section data and fits from the literature. These processes do not lead to proton energy changes that take protons out of the rf bucket in the machine, but they do lead to large angular kicks ( $\langle \theta^2 \rangle^{1/2} \approx 85 \text{ mrad} / p(\text{GeV}/c)$  for nuclear elastic and  $\langle \theta^2 \rangle^{1/2} \approx 298 \text{ mrad} / p(\text{GeV}/c)$  for quasi-elastic). These are for so-called amorphous scattering. It was suggested that corrections be included in these formulas for small angle and channeled motion near planes, where reduction in the scattering rate is expected. Work on so-called diffractive nucleus/proton excitation, in which significant energy loss occurs, is in progress. Said Hasan offered to send Noble and Spencer a copy of his CRYM code to test the nuclear formulas. Once these are tested, they can be included by Hasan in the next release of CRYM for use in improved tracking studies.

### 2. G. Cavoto: Halo generation with the electrostatic dumper in Particle Tracking WG

Gianluca Cavoto described new tracking simulations of the effect of different voltage settings for the electrostatic dumper on the emittance and particle diffusion at the crystal position. In the model there is no detailed crystal interaction included, and particles are stopped in the tracking simulation when they hit the crystal. A thousand particles are started at some number of sigma from the beam center (typically 5-6  $\sigma$ ), and these are followed for  $10^4$  turns. About half the particles are lost in 100 turns, and the remainder continues to spill out at a steady state rate after that. Dumper voltages are typically about 330-360 V to produce steady-state particle loss rates on the crystal of 310-460 Hz for the experiment. Next steps are to include the effect of octupole magnets and to study the details of the phase space at the crystal location.

### 3. AOB

On 18 June there will be the first set-up of the accelerator for UA9. It is not clear when the next Simulations webex will occur given this conflict of schedule. The 24<sup>th</sup> of June is a possible meeting date, and participants may send in their comments on the proposed date to Bob Noble and Marco Silari.