

## Simulating particle interactions in transit with Impact-T

Acceleration of a molecular hydrogen ion ( $H_2^+$ ) beam in a radio-frequency quadrupole (RFQ) is proposed as the first stage of acceleration for a high-intensity continuous wave (CW) proton accelerator. This reduces the electric current in the RFQ by a factor of two, compared with accelerating the proton beam directly, and also allows existing designs for deuteron RFQs to be applied to molecular hydrogen ions, as the charge-to-mass ratio is almost identical. However, composite ions are susceptible to particle interactions that do not affect single ions, such as stripping of electrons and charge exchange. Such interactions may lead to production of secondary particles, which in high-intensity beams may cause damage to the accelerator and reduce the quality of the beam. In order to understand these effects, we have modified the Impact-T particle tracking code to include particle interactions during the tracking simulation. This code is also designed to be easily extensible to other interactions, such as collisions or break-up of heavier ions. Preliminary results and possibilities for future development will be discussed.

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