TMCI:
SIMPLE FORMULA VS. HEADTAIL CODE
$\Longrightarrow$ ENERGY SCAN (without space charge)

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- **HEADTAIL simulations for the SPS from GR (constant longitudinal emittance): Scan vs. injection energy**

26 GeV $\Longrightarrow$ $N_b^{th} \approx 0.6 \times 10^{11}$ p/b

40 GeV $\Longrightarrow$ $N_b^{th} \approx 1.5 \times 10^{11}$ p/b

60 GeV $\Longrightarrow$ $N_b^{th} \approx 1.9 \times 10^{11}$ p/b

450 GeV $\Longrightarrow$ $N_b^{th} \approx 1.9 \times 10^{11}$ p/b

$|\eta|$ is 2.2 times bigger

$|\eta|$ is 1.2 times bigger

$|\eta|$ is 1.1 times bigger

- **From the simple formula** $N_b^{th} \propto |\eta| \varepsilon_l$

$\Longrightarrow$ **What is important is not the energy (it is sometimes said that the threshold increases with energy as the beam is more rigid), but the distance from the transition energy**

$\Longrightarrow$ **This point may be of some interest if in some upgrade scenarios the transition energy is changed…**