SPS rapidity

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calculating y_{CM} for SPS 158 A GeV Pb+Pb:

$$
\begin{aligned}
E &= \gamma m \\
158 + 0.9315 &= \frac{0.9315}{\sqrt{1 - \beta^2}} \\
\beta &= \sqrt{1 - \left(\frac{0.9315}{158 + 0.9315}\right)^2} \\
y_{\text{beam}} &= \tanh^{-1} \beta \\
y_{\text{CM}} &= \frac{1}{2}(y_{\text{beam}} + 0) \\
&= 2.92
\end{aligned}
$$