

Why are we adding transverse momenta?

- Why not multiply?
(or add logs)?
- Serious proposal to use $M_{\text{eff}}^2 - (u_T)^2$ in [arXiv:1105.2977](#)
- Why are the signs the same? Why equal weights?
Silly?
- **How many years** would it take ATLAS/CMS to discover the **invariant mass for $Z \rightarrow a b$** ?

$$M_{\text{happy}} = \left(\prod_{i=1}^n \mathbf{p}_T^i \right)^{\frac{1}{n}}$$

$$M^2 = \left(\sqrt{m_a^2 + a_x^2 + a_y^2 + a_z^2} + \sqrt{m_b^2 + b_x^2 + b_y^2 + b_z^2} \right)^2 - (a_x + b_x)^2 - (a_y + b_y)^2 - (a_z + b_z)^2$$