A MODIFICATION OF THE RELATIVISTIC ENERGY-MOMENTUM RELATION

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$$E^2 = m^2c^4 + p^2c^2 \tag{1}$$

$$E = \frac{mc^2}{\sqrt{1 - v^2/c^2}} \tag{2}$$

ANY MODIFICATION MUST SATISFY THE CONSTRAINTS:

1) Relativistic: For m = 0, E = pc. (3)

2) Non-relativistic: K.E. = $\frac{1}{2}$ mv^2 (4)

MODIFICATION:

$$E = \frac{mc(m)^2}{\sqrt{1 - v^2/c(m)^2}} \tag{5}$$

$$c \quad \Rightarrow \quad c(m) = c[1 + F(\zeta)] \tag{6}$$

$$\zeta = m/P_M \tag{7}$$

Planck mass:

$$P_M = \sqrt{\hbar c/G_N} \approx 1,22 \times 10^{19} GeV/c^2 \approx 2.18 \times 10^{-5} gr.$$

F(0) = 0 $\Rightarrow$ E = pc, for m = 0.

Experimental constraints:

$$F(\zeta) \longrightarrow 0$$

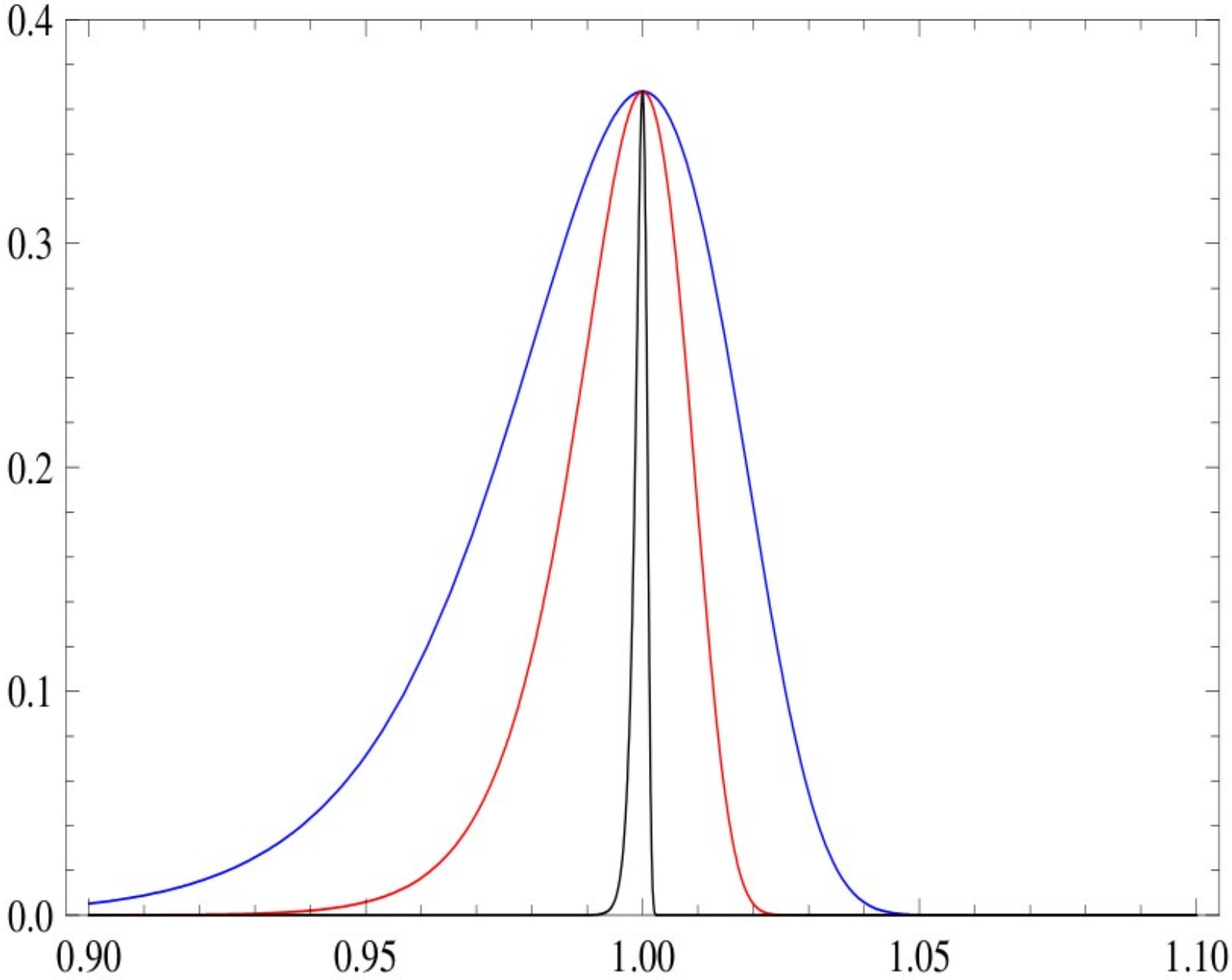
a) Small ζ or small m.

b) Large ζ or large m.

$$F(\zeta) = \zeta^n exp(-\zeta^n)$$

- Maximum value F(1) = e^{-1}. Ind. of "n".

- Sequence of functions as n $\rightarrow \infty$: is like a finite Dirac function at $\zeta = 1$.



The Function F(x) for n = 50, 100, 1000 in blue, red and black respectively.
The maximim height at x = 1 is independent of n.

- Effect of modification only important for $m \sim P_M$.

- Experimental test in this mass range is needed.