

Baryon as superpartner of the meson trajectory

$$|\phi\rangle = \begin{pmatrix} \phi_{\text{Meson}} \\ \phi_{\text{Baryon}} \end{pmatrix}$$

- Compare superconformal meson-baryon equations with LFWE for nucleon (leading twist) and pion:

$$\left(-\frac{d^2}{dx^2} + \lambda^2 x^2 + 2\lambda f + \lambda + \frac{4(f - \frac{1}{2})^2 - 1}{4x^2} \right) \phi_{\text{Baryon}} = M^2 \phi_{\text{Baryon}}$$

$$\left(-\frac{d^2}{d\zeta^2} + \lambda_B^2 \zeta^2 + 2\lambda_B(L_B + 1) + \frac{4L_B^2 - 1}{4\zeta^2} \right) \psi_{L_B}^+ = M^2 \psi_{L_B}^+$$

$$\left(-\frac{d^2}{dx^2} + \lambda^2 x^2 + 2\lambda f - \lambda + \frac{4(f + \frac{1}{2})^2 - 1}{4x^2} \right) \phi_{\text{Meson}} = M^2 \phi_{\text{Meson}}$$

$$\left(-\frac{d^2}{d\zeta^2} + \lambda_M^2 \zeta^2 + 2\lambda_M(L_M - 1) + \frac{4L_M^2 - 1}{4\zeta^2} \right) \phi_{L_M} = M^2 \phi_{L_M}$$

- Find: $\lambda = \lambda_M = \lambda_B, \quad f = L_B + \frac{1}{2} = L_M - \frac{1}{2} \quad \Rightarrow \quad \boxed{L_M = L_B + 1}$