Notations

$$\Phi = \phi + \sqrt{2}\lambda\theta + F\theta^2$$

$$V = -\overline{\theta\sigma_\mu}\theta A_\mu + i\theta^2\overline{\theta\lambda} + i\overline{\theta^2}\theta\lambda - \frac{i}{2}\theta^2\overline{\theta}^2 D$$

$$W^\alpha = -\lambda^\alpha + \theta^\alpha D + \frac{1}{2}\left[\sigma_\mu\overline{\sigma}_\nu\theta\right]^\alpha F_{\mu\nu} - \theta^2 i\slashed{\partial}^{\alpha\dot\alpha}\overline{\lambda}_{\dot\alpha}$$

$$\sigma_\mu^{\alpha\dot\alpha} = \left(1,\ -i\tau^a\right), \qquad \overline{\sigma}_{\mu\dot\alpha\alpha} = \left(1,\ i\tau^a\right)$$

$$D^\alpha = \partial^\alpha - i\slashed{\partial}^{\alpha\dot\alpha}\overline{\theta}_{\dot\alpha} \quad \epsilon_{\alpha\beta} = \epsilon_{\dot\alpha\dot\beta} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \quad \psi_\alpha = \epsilon_{\alpha\beta}\psi^\beta \quad \overline{\psi}_{\dot\alpha} = \epsilon_{\dot\alpha\dot\beta}\overline{\psi}^{\dot\beta}$$

$$\overline{D}_{\dot\alpha} = \overline{\partial}_{\dot\alpha} - i\overline{\slashed{\partial}}_{\dot\alpha\alpha}\theta^\alpha \quad \epsilon^{\alpha\beta} = \epsilon^{\dot\alpha\dot\beta} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \quad \psi^\alpha = \epsilon^{\alpha\beta}\psi_\beta \quad \overline{\psi}^{\dot\alpha} = \epsilon^{\dot\alpha\dot\beta}\overline{\psi}_{\dot\beta}$$

$$W^2 = W_\alpha W^\alpha, \qquad \overline{W}^2 = \overline{W}^{\dot\alpha}\overline{W}_{\dot\alpha}$$

$$\overline{W}_{\dot\alpha} = -\overline{\lambda}_{\dot\alpha} + \overline{\theta}_{\dot\alpha} D - \frac{1}{2}\left[\overline{\sigma}_\mu\sigma_\nu\overline{\theta}\right]_{\dot\alpha} F_{\mu\nu} - \overline{\theta}^2(i\overline{\slashed{\partial}}\lambda)_{\dot\alpha}$$

$$x_L \equiv y \equiv x_\mu + i\overline{\theta\sigma_\mu}\theta, \qquad \Phi = \Phi(y), \qquad \overline{\Phi} = \overline{\Phi}(x_R)$$

$$\nabla_\mu = \partial_\mu - iA_\mu^a\frac{\tau^2}{2}, \quad \text{for SU(2)}$$

$$V(y) = -\overline{\theta\sigma_\mu}\theta A_\mu(y) + i\theta^2\overline{\theta\lambda}(y) + i\overline{\theta}^2\theta\lambda(y) - \frac{i}{2}\theta^2\overline{\theta}^2\left[D(y) - \partial_\mu A^\mu(y)\right]$$

$$W^\alpha = -\frac{i}{4}\overline{DD}D^\alpha V \qquad \left(\text{has to be renormalized for } e^{-2V} \text{ in the chiral representation}\right)$$

Shift: $x_L \rightarrow x$ is $e^{-i\theta\slashed{\partial}\theta}$

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Useful formulae

$$\theta^\alpha \theta^\beta \;=\; \tfrac{1}{2}\theta^2 \epsilon^{\alpha\beta} \qquad\qquad \theta^1\theta^2 \;=\; -\tfrac{1}{2}\theta^2$$

$$\theta_\alpha \theta_\beta \;=\; -\tfrac{1}{2}\theta^2 \epsilon_{\alpha\beta} \qquad\qquad \theta_1\theta_2 \;=\; -\tfrac{1}{2}\theta^2$$

$$\overline{\theta^{\dot\alpha}\theta^{\dot\beta}} \;=\; -\tfrac{1}{2}\overline\theta^2 \epsilon^{\dot\alpha\dot\beta} \qquad\qquad \overline{\theta^{\dot 1}\theta^{\dot 2}} \;=\; \tfrac{1}{2}\overline\theta^2$$

$$\overline{\theta_{\dot\alpha}\theta}_{\dot\beta} \;=\; \tfrac{1}{2}\overline\theta^2 \epsilon_{\dot\alpha\dot\beta} \qquad\qquad \overline{\theta_{\dot 1}\theta_{\dot 2}} \;=\; \tfrac{1}{2}\overline\theta^2$$

$$\theta\lambda\,\theta\psi \;=\; -\tfrac{1}{2}\,\theta^2\lambda\psi \qquad\qquad \overline{\theta\lambda}\,\overline{\theta\psi} \;=\; -\tfrac{1}{2}\,\overline\theta^2\overline{\lambda\psi}$$

$$\sigma_\mu\,\overline\sigma_\nu\,\sigma_\rho \;=\; \eta_{\mu\nu}\,\sigma_\rho \;+\; \eta_{\nu\rho}\,\sigma_\mu \;-\; \eta_{\mu\rho}\,\sigma_\nu \;-\; \epsilon_{\mu\nu\rho\lambda}\,\sigma_\lambda$$

$$\sigma_\mu^{\beta\dot\beta}\,\overline\sigma^\mu_{\dot\alpha\alpha} \;=\; 2\delta_\alpha^{\;\beta}\delta_{\dot\alpha}^{\;\dot\beta}$$

$$\overline\sigma_\mu\,\sigma_\nu\,\overline\sigma_\rho \;=\; \eta_{\mu\nu}\,\overline\sigma_\rho \;+\; \eta_{\nu\rho}\,\overline\sigma_\mu \;-\; \eta_{\mu\rho}\,\overline\sigma_\nu \;+\; \epsilon_{\mu\nu\rho\lambda}\,\overline\sigma_\lambda$$

$$Tr\,(\overline\sigma^\mu\sigma^\nu) \;=\; 2\eta^{\mu\nu} \qquad\qquad \theta\sigma^\mu\theta\overline{\theta}\,\overline\sigma^\nu\theta \;=\; \tfrac{1}{2}\theta^2\overline\theta^2\eta^{\mu\nu}$$

$$\partial_\alpha\theta_\beta \;=\; \epsilon_{\alpha\beta} \qquad\qquad \overline{\partial^{\dot\alpha}\theta}^{\dot\beta} \;=\; \epsilon^{\dot\alpha\dot\beta}$$

$$\partial^\alpha\theta^2 \;=\; 2\theta^\alpha \qquad\qquad \overline\partial_{\dot\alpha}\overline\theta^2 \;=\; 2\overline\theta_{\dot\alpha}$$

$$\partial^2\theta^2 \;=\; -4 \qquad\qquad \overline{\partial^2\theta^2} \;=\; -4$$

$$\epsilon_{\alpha\gamma}\epsilon^{\gamma\beta} \;=\; \delta_\alpha^\beta \qquad\qquad \epsilon_{\dot\alpha\dot\gamma}\epsilon^{\dot\gamma\dot\beta} \;=\; \delta_{\dot\alpha}^{\dot\beta}$$

$$\epsilon^{\alpha\gamma}\epsilon_{\gamma\beta} \;=\; \delta_\beta^\alpha \qquad\qquad \epsilon^{\dot\alpha\dot\gamma}\epsilon_{\dot\gamma\dot\beta} \;=\; \delta_{\dot\beta}^{\dot\alpha}$$

$$\sigma^{(\mu}\overline\sigma^{\nu)} \;=\; 2\eta^{\mu\nu} \qquad\qquad \partial\!\!\!/\,\overline\partial\!\!\!/ \;=\; \overline\partial\!\!\!/\,\partial\!\!\!/ \;=\; \Box$$

$$D_\alpha D^\alpha \;=\; \partial^2 \;-\; 2\,i\partial_\alpha \partial\!\!\!/^{\alpha\dot\beta}\overline\theta_{\dot\beta} \;+\; \Box\overline\theta^2$$

$$\overline{D^{\dot\alpha}D}_{\dot\alpha} \;=\; \overline\partial^2 \;+\; 2i\overline{\partial\!\!\!/}_{\dot\alpha\alpha}\theta^\alpha\overline\partial^{\dot\alpha} \;+\; \theta^2\Box$$

$$\left\{D^\alpha\,\overline D^{\dot\alpha}\right\} \;=\; 2i\,\partial\!\!\!/^{\alpha\dot\alpha}$$

Chiral Superfields

$$\Phi(y) = \phi(y) + \sqrt{2}\,\psi\,\theta + F\,\theta^2 \,, \qquad y^\mu = x^\mu + i\,\overline{\theta}\overline{\sigma}^\mu\theta$$

$$\overline{\Phi}(\overline{y}) = \overline{\phi}(\overline{y}) + \sqrt{2}\,\overline{\psi}\,\overline{\theta} + \overline{F}\,\overline{\theta}^2 \,, \qquad \overline{y}^\mu = x^\mu - i\,\overline{\theta}\overline{\sigma}^\mu\theta$$

$$\Phi(y) = \phi(x) + \sqrt{2}\,\theta\psi + \theta^2 F + i\,\overline{\theta}\overline{\partial}\theta\,\phi - i\,\frac{\sqrt{2}}{2}\,\theta^2\,\overline{\theta}\overline{\partial}\,\psi - \frac{1}{4}\,\theta^4\,\square\phi$$

$$\overline{\Phi}(\overline{y}) = \overline{\phi}(x) + \sqrt{2}\,\overline{\theta}\overline{\psi} + \overline{\theta}^2\overline{F} + i\,\theta\partial\overline{\theta}\,\overline{\phi} - i\,\frac{\sqrt{2}}{2}\,\overline{\theta}^2\,\theta\partial\,\overline{\psi} - \frac{1}{4}\,\theta^4\,\square\overline{\phi}$$

$$\int d^4\theta = \frac{1}{16}\,D^2\,\overline{D}^2\Big| \qquad\qquad \int d^4\theta = \frac{1}{16}\,\overline{D}^2\,D^2\Big|$$

$$\int d^2\theta = -\frac{1}{4}\,D^2\Big| \qquad\qquad \int d^2\overline{\theta} = -\frac{1}{4}\,\overline{D}^2\Big|$$

$$D^\alpha\Phi\Big| = \sqrt{2}\psi^\alpha \qquad\qquad \overline{D}_{\dot\alpha}\overline{\Phi}\Big| = \sqrt{2}\overline{\psi}_{\dot\alpha}$$

$$D^2\Phi\Big| = -4\,F \qquad\qquad \overline{D^2\Phi}\Big| = -4\,\overline{F}$$

$$\overline{D}^{\dot\alpha}D^\alpha\Phi = 2i\,\partial^{\alpha\dot\alpha}\Phi \qquad\qquad D^\alpha\overline{D}^{\dot\alpha}\overline{\Phi} = 2i\,\partial^{\alpha\dot\alpha}\overline{\Phi}$$

$$\overline{D}_{\dot\alpha}D^2\Phi = 4i\,\overline{\partial}_{\dot\alpha\beta}D^\beta\Phi \qquad\qquad D^\alpha\overline{D}^2\overline{\Phi} = 4i\,\partial^{\alpha\dot\beta}\overline{D}_{\dot\beta}\overline{\Phi}$$

$$\overline{D}_{\dot\alpha}D^2\Phi\Big| = 4\sqrt{2}i\,\overline{\partial}_{\dot\alpha\beta}\psi^\beta \qquad\qquad D^\alpha\overline{D}^2\overline{\Phi}\Big| = 4\sqrt{2}i\,\partial^{\alpha\dot\beta}\overline{\psi}_{\dot\beta}$$

$$\overline{D}^2D^2\Phi = -16\,\square\Phi \qquad\qquad D^2\overline{D}^2\overline{\Phi} = -16\,\square\overline{\Phi}$$

$$\ln\Phi(y) = \ln\phi + \sqrt{2}\,\theta\,\psi/\phi + \theta^2\left(F/\phi + \frac{1}{2}\left(\psi/\phi\right)^2\right)$$

$$\ln\overline{\Phi}(\overline{y}) = \ln\overline{\phi} + \sqrt{2}\,\overline{\theta}\,\overline{\psi}/\overline{\phi} + \overline{\theta}^2\left(\overline{F}/\overline{\phi} + \frac{1}{2}\left(\overline{\psi}/\overline{\phi}\right)^2\right)$$

$\mathcal{N} = 1$ Supersymmetry Transformations

$$Q^\alpha = \partial^\alpha + i\slashed{\partial}^{\alpha\dot\alpha}\overline{\theta}_{\dot\alpha}$$

$$\overline{Q}_{\dot\alpha} = \overline{\partial}_{\dot\alpha} + i\overline{\slashed{\partial}}_{\dot\alpha\alpha}\theta^\alpha$$

$$\delta\phi = \sqrt{2}\,\epsilon\,\psi \qquad\qquad\qquad \delta\overline{\phi} = \sqrt{2}\,\overline{\epsilon\,\psi}$$

$$\delta\psi_\alpha = i\sqrt{2}\,\overline{\epsilon^{\dot\alpha}}\overline{\slashed{\partial}}_{\dot\alpha\alpha}\phi \;+\; \sqrt{2}\,\epsilon_\alpha F \qquad \delta\overline{\psi}^{\dot\alpha} = i\sqrt{2}\,\epsilon_\alpha\slashed{\partial}^{\alpha\dot\alpha}\overline{\phi} \;+\; \sqrt{2}\,\overline{\epsilon^{\dot\alpha}\,F}$$

$$\delta F = -i\sqrt{2}\,\overline{\epsilon}\,\overline{\slashed{\partial}}\psi \qquad\qquad\qquad \delta\overline{F} = -i\sqrt{2}\,\epsilon\slashed{\partial}\overline{\psi}$$

Formulae for Two Dimensions

$$\partial_R \;=\; \partial_0 \,+\, i\,\partial_3 \qquad\qquad \partial_L \;=\; \partial_0 \,-\, i\,\partial_3$$

$$\not{\partial} \;=\; \begin{pmatrix} \partial_L & \\ & \partial_R \end{pmatrix}^{\alpha\dot\alpha} \qquad\qquad \overline{\not{\partial}} \;=\; \begin{pmatrix} \partial_R & \\ & \partial_L \end{pmatrix}_{\dot\alpha\alpha}$$

$$\xi_1 \;\equiv\; \xi_R \qquad \overline{\xi}_1 \;\equiv\; \overline{\xi}_R \qquad \epsilon\,\xi \;=\; -\,\epsilon_{[R}\,\xi_{L]} \qquad \xi^1 \;=\; -\,\xi_L$$

$$\xi_2 \;\equiv\; \xi_L \qquad \overline{\xi}_2 \;\equiv\; \overline{\xi}_L \qquad \overline{\epsilon\,\xi} \;=\; \overline{\epsilon_{[R}\,\xi_{L]}} \qquad \xi^2 \;=\; \xi_R$$

$$\theta^2 \;=\; -\,2\,\theta_R\,\theta_L \qquad\qquad D^2 \;=\; -\,2\,D_R\,D_L$$

$$\overline{\theta}^2 \;=\; 2\,\overline{\theta_R\,\theta_L} \qquad\qquad \overline{D}^2 \;=\; 2\,\overline{D_R\,D_L}$$

$$D_R \;\equiv\; D^1 \qquad\qquad \overline{D}_R \;\equiv\; \overline{D}_{\dot 2} \;=\; -\,\overline{D}^{\dot 1}$$

$$D_L \;\equiv\; D^2 \qquad\qquad \overline{D}_L \;\equiv\; -\,\overline{D}_{\dot 1} \;=\; -\,\overline{D}^{\dot 2}$$

$$\{\overline{D}_R\,D_L\} \;=\; 0 \qquad\qquad \{\overline{D}_R\,D_R\} \;=\; -\,2i\,\partial_L$$

$$\{\overline{D}_L\,D_R\} \;=\; 0 \qquad\qquad \{\overline{D}_L\,D_L\} \;=\; -\,2i\,\partial_R$$

$$\vartheta_R \;=\; \partial\!\!\!/\partial\theta_R \qquad\qquad \vartheta_L \;=\; \partial\!\!\!/\partial\theta_L$$

$$\overline{\vartheta}_R \;=\; \partial\!\!\!/\partial\overline{\theta}_R \qquad\qquad \overline{\vartheta}_L \;=\; \partial\!\!\!/\partial\overline{\theta}_L$$

$$D_R \;=\; \vartheta_R \,-\, i\,\overline{\theta}_R\,\partial_L \qquad\qquad \overline{D}_R \;=\; \overline{\vartheta}_R \,-\, i\,\theta_R\,\partial_L$$

$$D_L \;=\; \vartheta_L \,-\, i\,\overline{\theta}_L\,\partial_R \qquad\qquad \overline{D}_L \;=\; \overline{\vartheta}_L \,-\, i\,\theta_L\,\partial_R$$

$$\sigma_\mu^{\beta\dot\beta}\,\overline{\sigma}^\mu_{\dot\alpha\alpha} \;=\; 2\,\delta_\alpha^{\;\beta}\delta_{\dot\alpha}^{\;\dot\beta}\cdot\delta_{\alpha\dot\alpha}\,, \qquad\qquad \mu \;=\; 0,3$$

$$\sigma_k^{\beta\dot\beta}\,\overline{\sigma}^k_{\dot\alpha\alpha} \;=\; 2\,\delta_\alpha^{\;\beta}\delta_{\dot\alpha}^{\;\dot\beta}\cdot\epsilon_{\alpha\dot\alpha}\,, \qquad\qquad k \;=\; 1,2$$

$$\theta_\alpha\overline{\theta}_{\dot\alpha} \;=\; \frac{1}{2}\,\theta\sigma_\mu\overline{\theta}\cdot\overline{\sigma}^\mu_{\dot\alpha\alpha}$$

$$\Phi(y) \;=\; \phi(y) \;-\; \sqrt{2}\,\theta_R\psi_L \;+\; \sqrt{2}\,\theta_L\psi_R \;-\; 2\,\theta_R\theta_L\,F$$

$$\Phi(\overline{y}) \;=\; \overline{\phi}(\overline{y}) \;+\; \sqrt{2}\,\overline{\theta_R\psi_L} \;-\; \sqrt{2}\,\overline{\theta_L\psi_R} \;+\; 2\,\overline{\theta_R\theta_L}\,\overline{F}$$

$$y^0 \;=\; x^0 \;+\; i\left(\overline{\theta}_R\theta_R + \overline{\theta}_L\theta_L\right) \qquad y^3 \;=\; x^3 \;+\; \left(\overline{\theta}_R\theta_R - \overline{\theta}_L\theta_L\right)$$

$$\overline{y}^0 \;=\; x^0 \;-\; i\left(\overline{\theta}_R\theta_R + \overline{\theta}_L\theta_L\right) \qquad \overline{y}^3 \;=\; x^3 \;-\; \left(\overline{\theta}_R\theta_R - \overline{\theta}_L\theta_L\right)$$

Twisted Chiral superfields

$$\Sigma(\widetilde{y}) \;=\; \sigma(\widetilde{y}) \;-\; \sqrt{2}\,\theta_R\overline{\lambda}_L \;+\; \sqrt{2}\,\overline{\theta}_L\lambda_R \;-\; i\sqrt{2}\,\theta_R\overline{\theta}_L\left(iD + F_{03}\right)$$

$$\overline{\Sigma}(\overline{\widetilde{y}}) \;=\; \overline{\sigma}(\overline{\widetilde{y}}) \;-\; \sqrt{2}\,\theta_L\overline{\lambda}_R \;+\; \sqrt{2}\,\overline{\theta}_R\lambda_L \;-\; i\sqrt{2}\,\theta_L\overline{\theta}_R\left(iD - F_{03}\right)$$

$$\widetilde{y}^\mu \;=\; x^\mu \;+\; i\,\overline{\theta}\widetilde{\overline{\sigma}}_\mu\theta \qquad \widetilde{\sigma}_0 \;=\; i\,\sigma_3 \qquad \widetilde{\sigma}_3 \;=\; -\,i\,\sigma_0$$

$$\overline{\widetilde{y}}^\mu \;=\; x^\mu \;+\; i\,\theta\widetilde{\sigma}_\mu\overline{\theta} \qquad \widetilde{\overline{\sigma}}_0 \;=\; i\,\overline{\sigma}_3 \qquad \widetilde{\overline{\sigma}}_3 \;=\; -\,i\,\overline{\sigma}_0$$

$$\widetilde{y}^0 \;=\; x^0 \;+\; i\left(\overline{\theta}_R\theta_R - \overline{\theta}_L\theta_L\right) \qquad \widetilde{y}^3 \;=\; x^3 \;+\; \left(\overline{\theta}_R\theta_R + \overline{\theta}_L\theta_L\right)$$

$$\overline{\widetilde{y}}^0 \;=\; x^0 \;-\; i\left(\overline{\theta}_R\theta_R - \overline{\theta}_L\theta_L\right) \qquad \overline{\widetilde{y}}^3 \;=\; x^3 \;-\; \left(\overline{\theta}_R\theta_R + \overline{\theta}_L\theta_L\right)$$

$$\widetilde{\slashed{\partial}} \;=\; \begin{pmatrix} \partial_L & \\ & -\partial_R \end{pmatrix}^{\alpha\dot\alpha} \qquad \overline{\widetilde{\slashed{\partial}}} \;=\; \begin{pmatrix} -\partial_R & \\ & \partial_L \end{pmatrix}_{\dot\alpha\alpha}$$

$$D_R = \left.{\partial}/{\partial\theta_R} - 2i\overline{\theta}_R\partial_L\right|_{\widetilde{y}} = \left.{\partial}/{\partial\theta_R}\right|_{\overline{\widetilde{y}}} \qquad \overline{D}_R = \left.{\partial}/{\partial\overline{\theta}_R}\right|_{\widetilde{y}} = \left.{\partial}/{\partial\overline{\theta}_R} - 2i\theta_R\partial_L\right|_{\overline{\widetilde{y}}}$$

$$D_L = \left.{\partial}/{\partial\theta_L}\right|_{\widetilde{y}} = \left.{\partial}/{\partial\theta_L} - 2i\overline{\theta}_L\partial_R\right|_{\overline{\widetilde{y}}} \qquad \overline{D}_L = \left.{\partial}/{\partial\overline{\theta}_L} - 2i\theta_L\partial_R\right|_{\widetilde{y}} = \left.{\partial}/{\partial\overline{\theta}_L}\right|_{\overline{\widetilde{y}}}$$

$$\int d^4\theta \;=\; \frac{1}{4}\,\overline{D}_R\,D_R\,\overline{D}_L\,D_L\Big| \qquad\qquad \int d^4\theta \;=\; -\,\frac{1}{4}\,\overline{D}_R\,D_L\,\overline{D}_L D_R\Big|$$

$$\int d^2\widetilde{\theta} \;=\; \frac{1}{2}\,\overline{D}_L\,D_R\Big| \qquad\qquad \int d^2\overline{\widetilde{\theta}} \;=\; \frac{1}{2}\,\overline{D}_R\,D_L\Big|$$

$$D_R\,\sqrt{2}\,\Sigma\Big| \;=\; -\,2\,\overline{\lambda}_L \qquad\qquad \overline{D}_R\,\sqrt{2}\,\overline{\Sigma}\Big| \;=\; +\,2\,\lambda_L$$

$$\overline{D}_L\,\sqrt{2}\,\Sigma\Big| \;=\; +\,2\,\lambda_R \qquad\qquad D_L\,\sqrt{2}\overline{\Sigma}\Big| \;=\; -\,2\,\overline{\lambda}_R$$

$$\frac{i}{2}\,\overline{D}_L D_R\,\sqrt{2}\,\Sigma\Big| \;=\; iD + F_{03} \qquad\qquad \frac{i}{2}\,\overline{D}_R D_L\,\sqrt{2}\,\overline{\Sigma}\Big| \;=\; iD - F_{03}$$

$$\ln\Sigma(\widetilde{y}) \;=\; \ln\sigma \;-\; \sqrt{2}\,\theta_R\overline{\lambda}_L/\sigma \;+\; \sqrt{2}\,\overline{\theta}_L\lambda_R/\sigma \;-\; i\,\theta_R\overline{\theta}_L\left(\frac{\sqrt{2}\,(iD + F_{03})}{\sigma} \;-\; 2\,i\,\frac{\overline{\lambda}_L}{\sigma}\frac{\lambda_R}{\sigma}\right)$$

$$\ln\overline{\Sigma}(\widetilde{y}) \;=\; \ln\overline{\sigma} \;-\; \sqrt{2}\,\theta_L\,\overline{\lambda}_R/\overline{\sigma} \;+\; \sqrt{2}\,\overline{\theta}_R\,\lambda_L/\overline{\sigma} \;-\; i\,\theta_L\overline{\theta}_R\left(\frac{\sqrt{2}\,(iD - F_{03})}{\overline{\sigma}} \;-\; 2\,i\,\frac{\overline{\lambda}_R}{\overline{\sigma}}\frac{\lambda_L}{\overline{\sigma}}\right)$$

Twisted Chiral Superfield $\boldsymbol{S}$

$$S \;=\; \frac{i}{2}\,\overline{D}_R D_L\,\ln\sqrt{2}\,\overline{\Sigma} \qquad\qquad \overline{S} \;=\; \frac{i}{2}\,\overline{D}_L D_R\,\ln\sqrt{2}\,\Sigma$$

$$S\Big| \;=\; \frac{\sqrt{2}\,\overline{\sigma}\,(iD - F_{03}) \;-\; 2\,i\,\overline{\lambda}_R\lambda_L}{\left(\sqrt{2}\,\overline{\sigma}\right)^2} \qquad \overline{S}\Big| \;=\; \frac{\sqrt{2}\,\sigma\,(iD + F_{03}) \;-\; 2\,i\,\overline{\lambda}_L\lambda_R}{\left(\sqrt{2}\,\sigma\right)^2}$$

$$D_R\,S \;=\; \partial_L\,\frac{D_L\sqrt{2}\,\overline{\Sigma}}{\sqrt{2}\,\overline{\Sigma}} \qquad\qquad D_R\,S\Big| \;=\; -\,2\,\partial_L\,\frac{\overline{\lambda}_R}{\sqrt{2}\,\overline{\sigma}}$$

$$\overline{D_R\,S} \;=\; -\,\partial_L\,\frac{\overline{D}_L\sqrt{2}\,\Sigma}{\sqrt{2}\,\Sigma} \qquad\qquad \overline{D_R\,S}\Big| \;=\; -\,2\,\partial_L\,\frac{\lambda_R}{\sqrt{2}\,\sigma}$$

$$\overline{D}_L S \;=\; -\,\partial_R\,\frac{\overline{D}_R\sqrt{2}\,\Sigma}{\sqrt{2}\,\overline{\Sigma}} \qquad\qquad \overline{D}_L S\Big| \;=\; -\,2\,\partial_R\,\frac{\lambda_L}{\sqrt{2}\,\overline{\sigma}}$$

$$D_L\,\overline{S} \;=\; \partial_R\,\frac{D_R\sqrt{2}\,\Sigma}{\sqrt{2}\,\Sigma} \qquad\qquad D_L\,\overline{S}\Big| \;=\; -\,2\,\partial_R\,\frac{\overline{\lambda}_L}{\sqrt{2}\,\sigma}$$

$$\frac{i}{2}\,\overline{D}_L D_R\,S \;=\; \square\,\ln\sqrt{2}\,\overline{\Sigma} \qquad\qquad \frac{i}{2}\,\overline{D}_L D_R\,S\Big| \;=\; \square\,\ln\sqrt{2}\,\overline{\sigma}$$

$$\frac{i}{2}\,\overline{D}_R D_L\,\overline{S} \;=\; \square\,\ln\sqrt{2}\,\Sigma \qquad\qquad \frac{i}{2}\,\overline{D}_R D_L\,\overline{S}\Big| \;=\; \square\,\ln\sqrt{2}\,\sigma$$

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Vector superfield

$$V(x) \;=\; -\;A_L\,\overline{\theta}_R\theta_R \;-\; A_R\,\overline{\theta}_L\theta_L \;-\; i\,\sqrt{2}\,\sigma\,\overline{\theta}_R\theta_L \;-\; i\,\sqrt{2}\,\overline{\sigma}\,\overline{\theta}_L\theta_R \;-$$
$$-\;2\,i\,\theta_R\theta_L\,\overline{\theta_{[R}\lambda_{L]}} \;-\; 2\,i\,\overline{\theta_R\theta}_L\,\theta_{[R}\lambda_{L]} \;-\; 2\,i\,\overline{\theta}_R\theta_R\overline{\theta}_L\theta_L\,D(x)$$

$$V(x) \;=\; -\;A_L\,\overline{\theta}_R\theta_R \;-\; A_R\,\overline{\theta}_L\theta_L \;-\; i\,\sqrt{2}\,\sigma\,\overline{\theta}_R\theta_L \;-\; i\,\sqrt{2}\,\overline{\sigma}\,\overline{\theta}_L\theta_R \;-$$
$$-\;2\,i\,\theta_R\theta_L\,\overline{\theta_{[R}\lambda_{L]}} \;-\; 2\,i\,\overline{\theta_R\theta}_L\,\theta_{[R}\lambda_{L]} \;-\; 2\,\overline{\theta}_R\theta_R\overline{\theta}_L\theta_L\,\Big(iD \pm F_{03}\Big)_{\widetilde{y},\,\overline{\widetilde{y}}}$$

$$A_R \;=\; A_0 \;+\; i\,A_3$$
$$A_L \;=\; A_0 \;-\; i\,A_3$$

$$\sigma \;=\; -\,\frac{A_1 + iA_2}{\sqrt{2}} \qquad\qquad \partial_{[R}A_{L]} \;=\; -\,2iF_{03}$$

$$\Sigma \;=\; \frac{i}{\sqrt{2}}\,D_L\,\overline{D}_R\,V \qquad\qquad \overline{\Sigma} \;=\; \frac{i}{\sqrt{2}}\,D_R\,\overline{D}_L\,V$$

Vortices

$$e^{i\alpha n\overline{n}} \cdot \hat{M} \cdot e^{-i\alpha n\overline{n}} \;=\; \hat{M} \;+\; i\sin\alpha \left[\, n\overline{n},\, \hat{M}\,\right] \;-\; (1-\cos\alpha)\left[\, n\overline{n}\left[\, n\overline{n},\, \hat{M}\,\right]\right]$$

Profiles

$$A_\pm^{\mathrm{U(1)}} \;=\; \mp\, i\,\frac{x^\pm}{r^2}\,\frac{1}{N}\,f(r)$$

$$A_\pm^{\mathrm{SU(N)}} \;=\; \mp\, i\,\frac{x^\pm}{r^2}\,f_N(r)\left(n\overline{n}-1/N\right)$$

$$\partial_r\left(\phi_1\,\phi_2^{N-1}\right) \;=\; \frac{f}{r}\cdot\phi_1\,\phi_2^{N-1}$$

$$\partial_r\frac{\phi_1}{\phi_2} \;=\; \frac{f_N}{r}\,\frac{\phi_1}{\phi_2}$$

F-term Profiles

$$q^f \;=\; \left(\begin{array}{cc} \dfrac{\phi}{\sqrt{2}} & \dfrac{\phi}{\sqrt{2}} \end{array}\right) \qquad \overline{q}_f \;=\; \left(\begin{array}{cc} \dfrac{\phi^\dagger}{\sqrt{2}} & \dfrac{\phi^\dagger}{\sqrt{2}} \end{array}\right)$$

$$q_f \;=\; \left(\begin{array}{cc} \dfrac{\phi}{\sqrt{2}} & -\dfrac{\phi}{\sqrt{2}} \end{array}\right) \qquad \overline{q}^f \;=\; \left(\begin{array}{cc} -\dfrac{\phi^\dagger}{\sqrt{2}} & \dfrac{\phi^\dagger}{\sqrt{2}} \end{array}\right)$$

Gauge Field Normalization

$$\hat{\mu}_1 \;=\; \sqrt{\frac{2}{N}}\,\mu_1 \qquad\qquad \hat{A}^a \;=\; \frac{1}{\sqrt{2N}}\,A^a \qquad\qquad \hat{T}^a \;=\; \sqrt{2N}\,T^a$$

Slashed Vectors

$$\slashed{a} \;=\; \left(\begin{array}{cc} a_L & -\,i\,a_- \\ -\,i\,a_+ & a_R \end{array}\right) \qquad\qquad \overline{\slashed{a}} \;=\; \left(\begin{array}{cc} a_R & i\,a_- \\ i\,a_+ & a_L \end{array}\right)$$

$$a_{R,L} \;=\; a_0 \;\pm\; i\,a_3 \qquad\qquad a_\pm \;=\; a_1 \;\pm\; i\,a_2$$