

# Field kinematics

Momentum	Norm	Frame
$k^\mu$	$k^2 == k_\mu \; k^\mu$	$n^\mu == \frac{k^\mu}{k}$

## Fundamental fields

Fields	Symmetries	SO(3)	Sources
$\mathcal{A}_{\alpha\beta\chi}$	StrongGenSet[{1, 2}, GenSet[-(1,2)]]	$\frac{1}{2} \; \eta_{\beta\chi} \; \overset{\#1}{1^-} \mathcal{A}_\alpha + \frac{1}{2} \; \eta_{\alpha\chi} \; \overset{\#1}{1^-} \mathcal{A}_\beta + \frac{4}{3} \; \overset{\#1}{2^-} \mathcal{A}_{\alpha\beta\chi} + \frac{1}{3} \; \eta_{\beta\chi} \; \overset{\#1}{0^+} \mathcal{A} \; n_\alpha + \overset{\#1}{1^+} \mathcal{A}_{\beta\chi} \; n_\alpha + \overset{\#1}{2^+} \mathcal{A}_{\beta\chi} \; n_\alpha - \frac{1}{3} \; \eta_{\alpha\chi} \; \overset{\#1}{0^+} \mathcal{A} \; n_\beta - \overset{\#1}{1^+} \mathcal{A}_{\alpha\chi} \; n_\beta - \overset{\#1}{2^+} \mathcal{A}_{\alpha\chi} \; n_\beta + \overset{\#2}{1^+} \mathcal{A}_{\alpha\beta} \; n_\chi - \frac{1}{2} \; \overset{\#1}{1^-} \mathcal{A}_\beta \; n_\alpha \; n_\chi - \overset{\#2}{1^+} \mathcal{A}_\beta \; n_\alpha \; n_\chi + \frac{1}{2} \; \overset{\#1}{1^-} \mathcal{A}_\alpha \; n_\beta \; n_\chi + \overset{\#2}{1^+} \mathcal{A}_\alpha \; n_\beta \; n_\chi - \frac{1}{6} \; \epsilon \eta_{\alpha\beta\chi\delta} \; \overset{\#1}{0^+} \mathcal{A} \; n^\delta$	$\sigma_{\alpha\beta\chi}$

## SO(3) irreps

SO(3)	Symmetries	Expansion	Sources
$\overset{\#1}{0^+} \mathcal{A}$	StrongGenSet[{ }, GenSet[]]	$\mathcal{A}_\alpha^\beta \; n^\alpha$	$\overset{\#1}{0^+} \sigma$
$\overset{\#1}{0^-} \mathcal{A}$	StrongGenSet[{ },    GenSet[]]    -	$\epsilon \eta_{\alpha\beta\chi\delta} \; \mathcal{A}^{\beta\chi\delta} \; n^\alpha$	$\overset{\#1}{0^-} \sigma$
$\overset{\#1}{1^+} \mathcal{A}_{\alpha\beta}$	StrongGenSet[{1, 2 }, GenSet[-(1,2)]]	$-\frac{1}{2} \; \mathcal{A}_{\alpha\beta} \; n^\chi + \frac{1}{2} \; \mathcal{A}_{\beta\chi\alpha} \; n^\chi - \frac{1}{2} \; \mathcal{A}_{\beta\chi\delta} \; n_\alpha \; n^\chi \; n^\delta + \frac{1}{2} \; \mathcal{A}_{\alpha\chi\delta} \; n_\beta \; n^\chi \; n^\delta$	$\overset{\#1}{1^+} \sigma_{\alpha\beta}$
$\overset{\#2}{1^+} \mathcal{A}_{\alpha\beta}$	StrongGenSet[{1, 2}, GenSet[-(1,2)]]	$\mathcal{A}_{\alpha\beta\chi} \; n^\chi + \mathcal{A}_{\beta\chi\delta} \; n_\alpha \; n^\chi \; n^\delta - \mathcal{A}_{\alpha\chi\delta} \; n_\beta \; n^\chi \; n^\delta$	$\overset{\#2}{1^+} \sigma_{\alpha\beta}$
$\overset{\#1}{1^-} \mathcal{A}_\alpha$	StrongGenSet[{ },    GenSet[]]    -	$\mathcal{A}_\alpha^\beta + \mathcal{A}_{\beta\chi}^\chi \; n_\alpha \; n^\beta + \mathcal{A}_{\alpha\beta\chi} \; n^\beta \; n^\chi$	$\overset{\#1}{1^-} \sigma_\alpha$
$\overset{\#2}{1^-} \mathcal{A}_\alpha$	StrongGenSet[{ }, GenSet[]]	$\mathcal{A}_{\alpha\beta\chi} \; n^\beta \; n^\chi$	$\overset{\#2}{1^-} \sigma_\alpha$
$\overset{\#1}{2^+} \mathcal{A}_{\alpha\beta}$	StrongGenSet[{1, 2}, GenSet[(1,2)]]	$\frac{1}{2} \; \mathcal{A}_{\alpha\beta} \; n^\chi - \frac{1}{2} \; \mathcal{A}_{\beta\chi\alpha} \; n^\chi - \frac{1}{3} \; \eta_{\alpha\beta} \; \mathcal{A}_\chi^\delta \; n^\chi + \frac{1}{3} \; \mathcal{A}_\chi^\delta \; n_\alpha \; n_\beta \; n^\chi + \frac{1}{2} \; \mathcal{A}_{\beta\chi\delta} \; n_\alpha \; n^\chi \; n^\delta + \frac{1}{2} \; \mathcal{A}_{\alpha\chi\delta} \; n_\beta \; n^\chi \; n^\delta$	$\overset{\#1}{2^+} \sigma_{\alpha\beta}$
$\overset{\#1}{2^-} \mathcal{A}_{\alpha\beta\chi}$	StrongGenSet[{1, 2}, GenSet[-(1,2)]]	$\frac{1}{2} \; \mathcal{A}_{\alpha\beta\chi} + \frac{1}{4} \; \mathcal{A}_{\alpha\chi\beta} - \frac{3}{8} \; \eta_{\beta\chi} \; \mathcal{A}_\alpha^\delta - \frac{1}{4} \; \mathcal{A}_{\beta\chi\alpha} + \frac{3}{8} \; \eta_{\alpha\chi} \; \mathcal{A}_\beta^\delta - \frac{3}{8} \; \mathcal{A}_\beta^\delta \; n_\alpha \; n_\chi + \frac{3}{8} \; \mathcal{A}_\alpha^\delta \; n_\beta \; n_\chi + \frac{1}{4} \; \mathcal{A}_{\beta\chi\delta} \; n_\alpha \; n^\delta + \frac{1}{2} \; \mathcal{A}_{\beta\delta\chi} \; n_\alpha \; n^\delta + \frac{1}{4} \; \mathcal{A}_{\chi\delta\beta} \; n_\alpha \; n^\delta + \frac{3}{8} \; \eta_{\beta\chi} \; \mathcal{A}_{\delta\epsilon}^\epsilon \; n_\alpha \; n^\delta - \frac{1}{4} \; \mathcal{A}_{\alpha\chi\delta} \; n_\beta \; n^\delta - \frac{1}{2} \; \mathcal{A}_{\alpha\delta\chi} \; n_\beta \; n^\delta - \frac{1}{4} \; \mathcal{A}_{\chi\delta\alpha} \; n_\beta \; n^\delta - \frac{3}{8} \; \eta_{\alpha\chi} \; \mathcal{A}_{\delta\epsilon}^\epsilon \; n_\beta \; n^\delta - \frac{1}{2} \; \mathcal{A}_{\alpha\beta\delta} \; n_\chi \; n^\delta - \frac{1}{4} \; \mathcal{A}_{\alpha\delta\beta} \; n_\chi \; n^\delta + \frac{1}{4} \; \mathcal{A}_{\beta\delta\alpha} \; n_\chi \; n^\delta + \frac{3}{8} \; \eta_{\beta\chi} \; \mathcal{A}_{\alpha\delta\epsilon}^\epsilon \; n^\delta \; n^\epsilon - \frac{3}{8} \; \eta_{\alpha\chi} \; \mathcal{A}_{\beta\delta\epsilon}^\epsilon \; n^\delta \; n^\epsilon - \frac{3}{8} \; \mathcal{A}_{\beta\delta\epsilon} \; n_\alpha \; n_\chi \; n^\delta \; n^\epsilon + \frac{3}{8} \; \mathcal{A}_{\alpha\delta\epsilon} \; n_\beta \; n_\chi \; n^\delta \; n^\epsilon$	$\overset{\#1}{2^-} \sigma_{\alpha\beta\chi}$