

## Lagrangian density

$$\beta \partial_\alpha \phi \partial^\alpha \phi + \frac{1}{2} \alpha \partial_\beta h^\chi_\chi \partial^\beta h^\alpha_\alpha + \alpha \partial_\alpha h^{\alpha\beta} \partial_\chi h^\chi_\beta - \alpha \partial^\beta h^\alpha_\alpha \partial_\chi h^\chi_\beta - \frac{1}{2} \alpha \partial_\chi h_{\alpha\beta} \partial^\chi h^{\alpha\beta}$$

Added source term:  $\phi \rho + h^{\alpha\beta} \mathcal{T}_{\alpha\beta}$

| Source constraints              |   |
|---------------------------------|---|
| SO(3) irreps                    | # |
| $\mathcal{T}^{\#2}_0 = 0$       | 1 |
| $\mathcal{T}^{\#1\alpha}_1 = 0$ | 3 |
| Total #:                        | 4 |

|               |               |                  |
|---------------|---------------|------------------|
| $h^{\#1}_0 +$ | $h^{\#2}_0 +$ | $\phi^{\#1}_0 +$ |
| $\alpha k^2$  | 0             | 0                |
| 0             | 0             | 0                |
| 0             | 0             | $\beta k^2$      |

$\mathcal{T}^{\#1}_{1^-} + \alpha$

|   |
|---|
| 0 |
|---|

$h^{\#1}_{1^-} + \alpha$

|   |
|---|
| 0 |
|---|

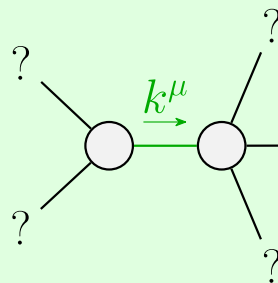
|                             |                           |                           |                       |
|-----------------------------|---------------------------|---------------------------|-----------------------|
|                             | $\mathcal{T}^{\#1}_{0^+}$ | $\mathcal{T}^{\#2}_{0^+}$ | $\rho^{\#1}_{0^+}$    |
| $\mathcal{T}^{\#1}_{0^+} +$ | $\frac{1}{\alpha k^2}$    | 0                         | 0                     |
| $\mathcal{T}^{\#2}_{0^+} +$ | 0                         | 0                         | 0                     |
| $\rho^{\#1}_{0^+} +$        | 0                         | 0                         | $\frac{1}{\beta k^2}$ |

$\mathcal{T}^{\#1}_{2^+} + \alpha\beta$

|                         |
|-------------------------|
| $-\frac{2}{\alpha k^2}$ |
|-------------------------|

$h^{\#1}_{2^+} + \alpha\beta$

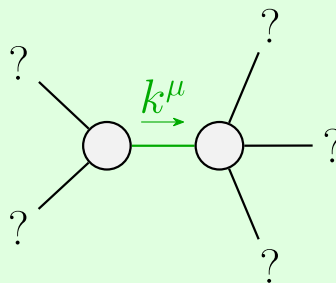
|                         |
|-------------------------|
| $-\frac{\alpha k^2}{2}$ |
|-------------------------|



Quadratic pole

Pole residue:  $-\frac{1}{\alpha} > 0$

Polarisations: 2



Quadratic pole

Pole residue:  $\frac{1}{\beta} > 0$

Polarisations: 1

Unitarity conditions  
 $\alpha < 0 \ \&\& \ \beta > 0$

(No massive particles)