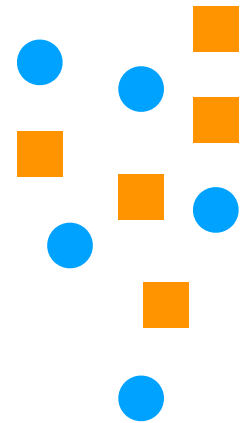


Event as input set

$$X = \{x_i\}$$

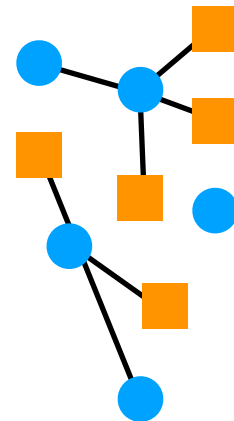


Graph building

$$\mathcal{F}(X | w) = A$$

Event as graph

$$X = \{x_i\}, A = A_{ij}$$



Message passing

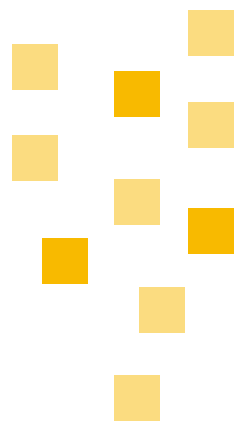
$$\mathcal{G}(X, A | w) = H$$

Transformed inputs

$$H = \{h_i\}$$

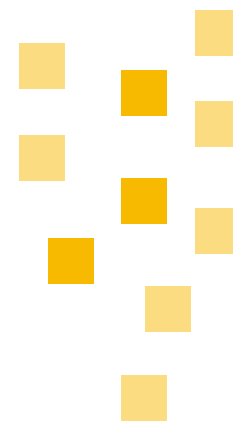


Target set $Y = \{y_j\}$



Elementwise loss $L(y_j, y'_j)$
classification & regression

Output set $Y' = \{y'_j\}$



Elementwise decoding

$$\mathcal{D}(x_j, h_j | w) = y'_j$$

$$x_i = [\text{elem. type}, p_T, E_{\text{ECAL}}, E_{\text{HCAL}}, \eta, \phi, \eta_{\text{outer}}, \phi_{\text{outer}}, q, \dots]$$

$$y_j = [\text{PID}, p_T, E, \eta, \phi, q], \quad \text{PID} \in \{\text{none, charged hadron, neutral hadron, } \gamma, e^\pm, \mu^\pm, \dots\}$$

$$h_i \in \mathbb{R}^{N_{\text{hidden}}}$$

Trainable neural networks: $\mathcal{F}, \mathcal{G}, \mathcal{D}$

● - track, ■ - calorimeter cluster, ■ - encoded element
■ - target (predicted) particle, ■ - no target (predicted) particle