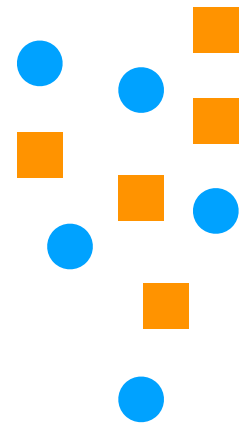


Event as input set

$$X = \{x_i\}$$



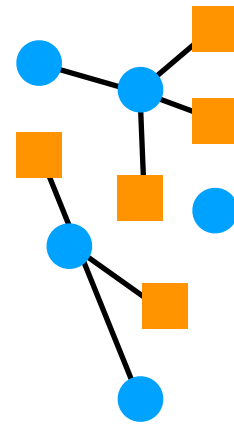
Graph building

LSH+kNN

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

Event as graph

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



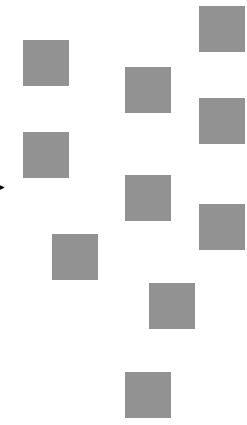
Message passing

GCN

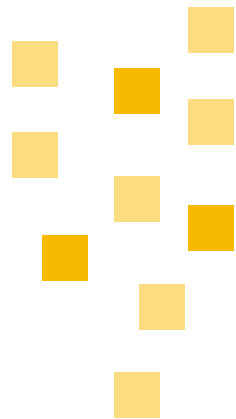
$$\mathcal{G}(X, A|w) = H$$

Transformed inputs

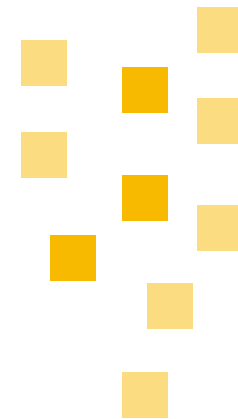
$$H = \{h_i\}$$



Target set $Y = \{y_i\}$



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



Elementwise loss $L(y_i, y'_i)$
classification & regression



Decoding

elementwise
FFN

$$\mathcal{D}(x_i, h_i|w) = y'_i$$



$$x_i = [\text{type}, p_T, E_{\text{ECAL}}, E_{\text{HCAL}}, \eta, \phi, \eta_{\text{outer}}, \phi_{\text{outer}}, q, \dots], \quad \text{type} \in \{\text{track}, \text{cluster}\}$$

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

$$h_i \in \mathbb{R}^N, N = 256$$

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