

# Methodology

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Advance Deep Learning Approach

# Cool, but How?

## Advance Deep Learning Approach

### Hybrid Model to Capture Local & Global Information:

- **Sparse Submanifold Convolutional Network (Local Info):**
  - A convolution that operates only on active voxels.
  - Efficiently learns local 3D features (shower shapes, track segments).
    - Efficiency SCNN: (16 times faster than a CNN on a GPU) [[Link](#)]
- **Hierarchical Transformer (Global Info):**
  - **Intra-Module Attention:** Summarizes patterns *within* each detector module.
  - **Inter-Module Attention:** given the created module summaries, combines them to learn the *entire event topology*.

