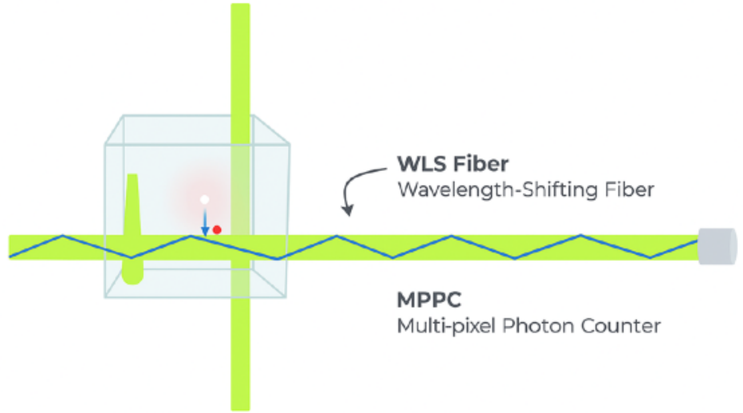
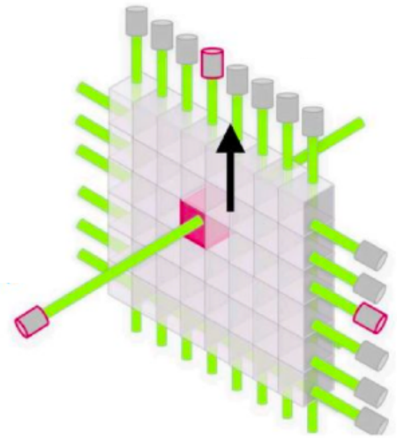
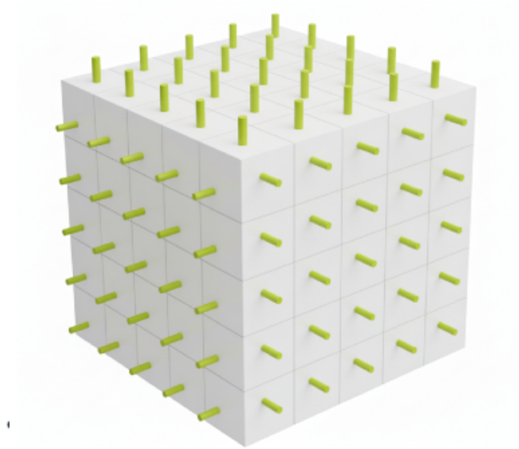
ForwArd Search ExpeRiment

FASERCal Run 4 Upgrade

- **The Basic Unit - Scintillating Voxel**
  - Detector built from thousands of **1 cm³ plastic cubes**
  - A **charged particle crossing a cube** → cube scintillates, emitting photons
- **Capturing the Light: Wavelength-Shifting (WLS) Fibers**
  - Three orthogonal fibers pierce each cube
  - Fibers absorb scintillation light → re-emit & guide photons to sensors at detector edges







The Data Challenge

Sparse 3D data

- **Three-Plane Readout**
  - Light collected from fibers along **X, Y, Z axes**
  - Produces three independent 2D projections of the event
- **Creating a 3D Image**
  - Combine 2D views → *Sparse* 3D event
  - Pinpoints **energy deposits** with fine resolution
- **Challenges:**
  - Energy reconstruction from 2D views is not unique
  - Ambiguity Creates "Ghosts"

Simple Simulation