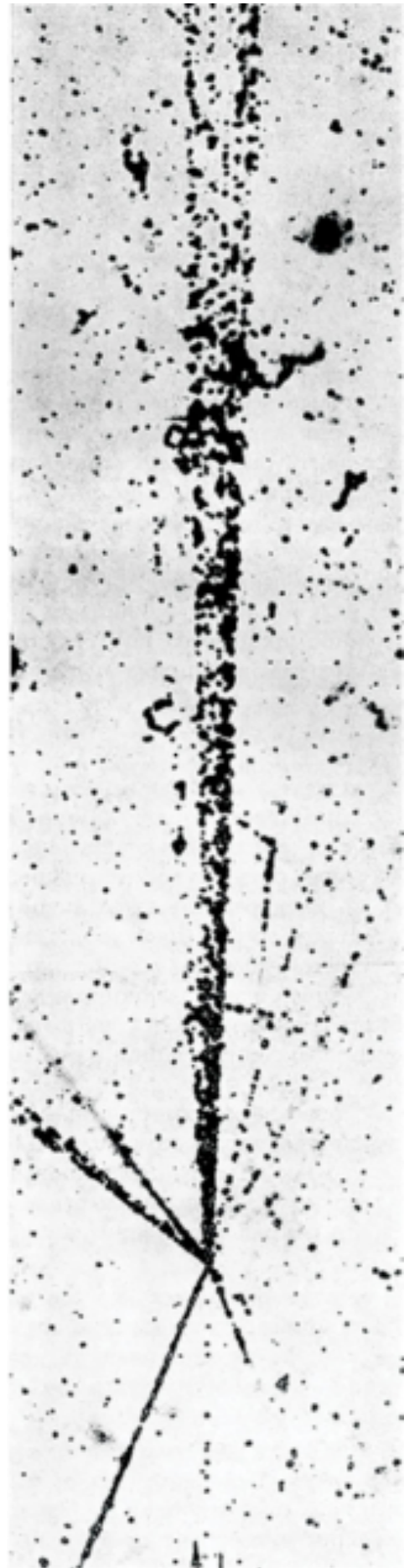


ForwArd Search ExpeRiment

From Run 3 to the High-Luminosity Challenge



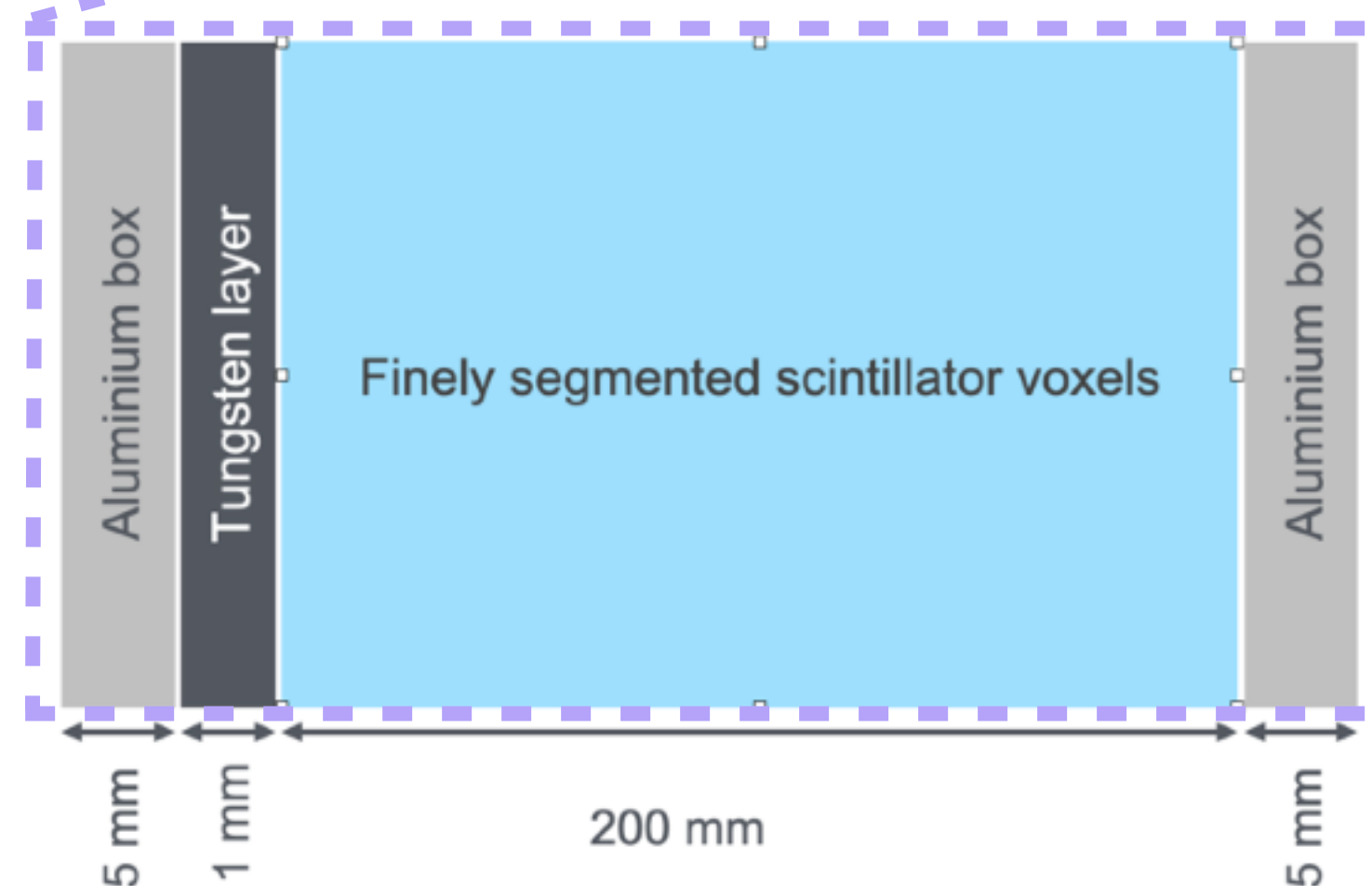
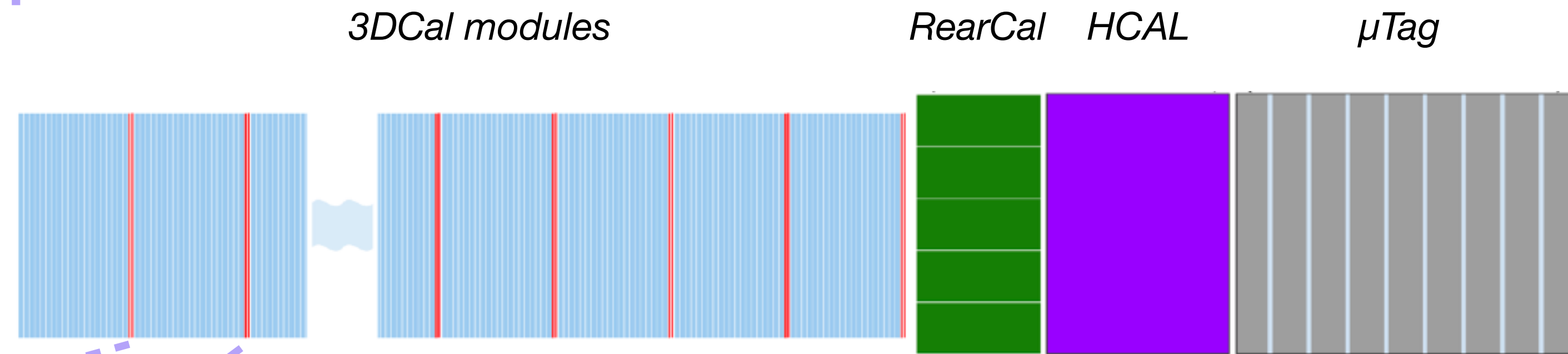
- **The FASER detector in Run 3:**
 - Commissioned during 2021 and started physics data taking in 2022.
 - *Core technology:* emulsion detectors → unmatched precision for tracking particle interactions. ($x \sim 300\text{nm}$, $\theta \sim 0.07 \text{ mrad}$).
- **The Coming Data Flood (LHC Run 4):**
 - High-Luminosity LHC, luminosity increase by a factor of 5.
 - ▶ *Expected $\sim 30,000$ neutrino interactions.*
- **The Technology Limit: Why We Must Upgrade**
 - The emulsion detector saturates ($30\text{-}50 \text{ fb}^{-1}$) and would need constant replacement: Not feasible.

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FASERCal Detector Conceptual Design

Proposed Solution: *FASERCal*

- Fully electronic 3D Precision Calorimeter for High Energy Neutrinos, and sub-detectors.
(A. Rubbia et al)



- 10 3DCal modules (520 kg):** each with 20 layers of 48x48 3D scintillator voxels → calorimetric information and tracking.
- RearCal:** sampling calorimeter to enhance EM shower containment + energy measurement.
- HCAL:** sampling calorimeter for hadronic energy measurements.
- μ Tag / spectrometer:** dedicated detector for muon measurement.