US HFCC: **AI**, **I**ntegrated Detector Concepts, & **M**icroelectronics

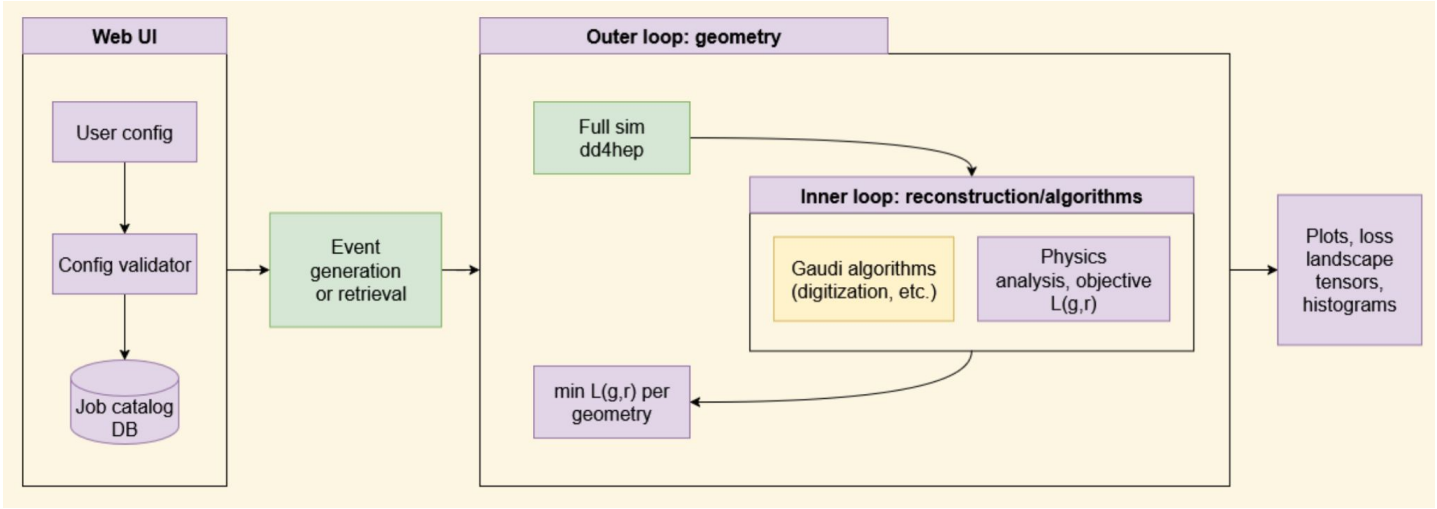
L2 : Julia Gonski, Jim Hirschauer
L3 : Tim Andeen, Liza Brost, Jennet Dickinson, Loukas Gouskos

FY27 Funding Request (DRAFT)

17 April 2026

FY26 Funded Activity: Bi-level Detector Optimization Framework

- Wonyong Chung (Princeton) “Bi-level AI-based Detector Optimization Framework
- **Status**: Wonyong implemented framework and complete example of outer (reconstruction) + inner (geometry) loops for dual readout crystal [Mar 2026]
- Funding through PSC for work shared by PSC and AIM
- FY26 budget: $33k (0.2 FTE of Wonyong)

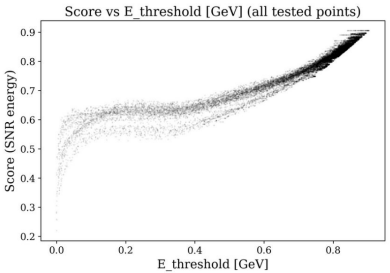


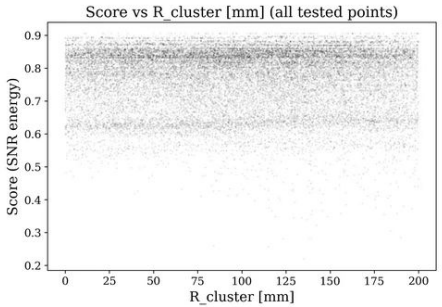
Bi-level Detector Optimization (BDO) + Agentic Workflows

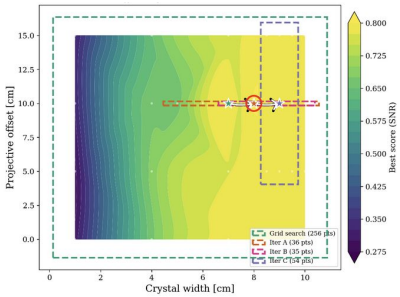
- Building on Wonyong's framework, SLAC has adapted scientific-focused AI agentic workflows to (a) improve efficiency / completeness of traversal of optimization space and (b) identify more optimal points
  - Effort: 0.2 postdoc Qibin Liu, 0.2 PhD student Liangyu Wu (ECA-funded) – good synergy with other funding
  - **First result** in preparation for the Stanford Physics & AI conference (PAI26) [2604.XXXXX]

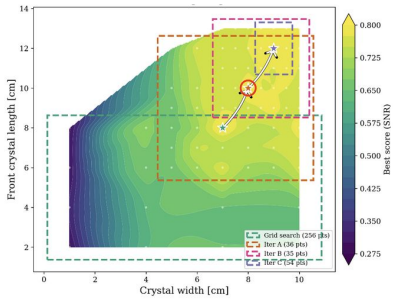
Next plans:

- Implement digitization in BDO framework to allow optimization of sampling rate and other features for waveform analysis task.
  - SLAC also studying "smart" readout for crystal DRO: interest in optimizing detector considering at-source feature extraction scenarios [2604.XXXXX]
- Full FCC-ee physics study, using the full IDEA detector, optimizing for sensitivity to trilinear higgs self coupling from ZH recoil – achievable with Agentic Workflow
- Towards EIC Detector 2 as nearer-term use case?









FY27 Request

Task	Budget	Justification
0.4 FTE Wonyong (continuing) Bi-level Detector Optimization Framework	$66k	Continue successful work towards increasingly complex/realistic optimization scenarios and integrating results into FCCee detector teams. Provide regular tutorials to community to ensure broad tool usage.
Detector Optimization Challenge + agents	$20k	Inspire better community engagement in detector concepts