How is the simulation chain ia organized

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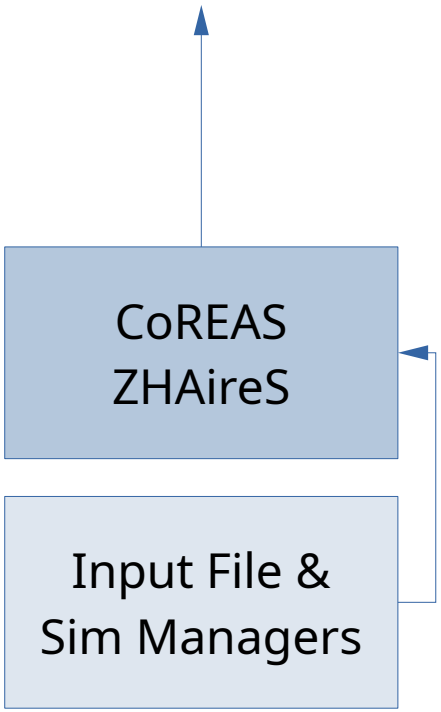
An opportunity to identify where you can contribute

How is the simulation pipe organized



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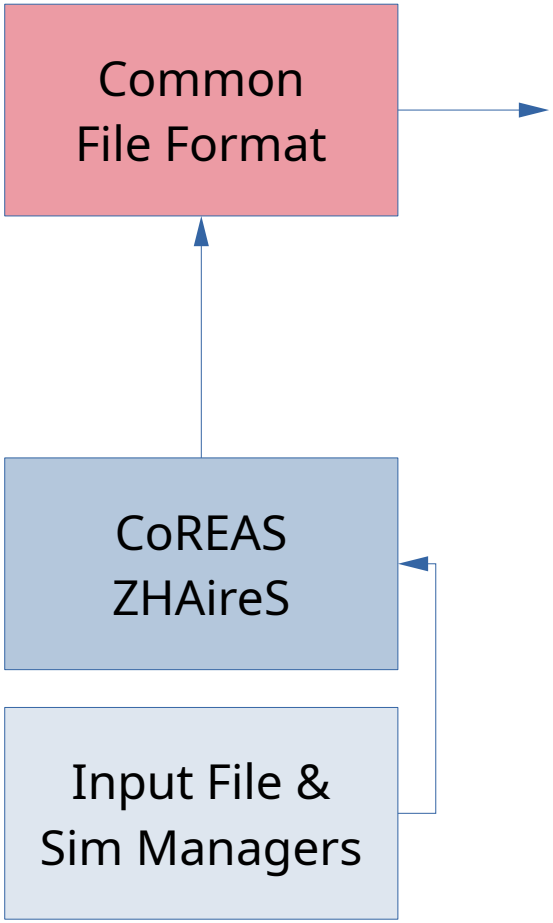

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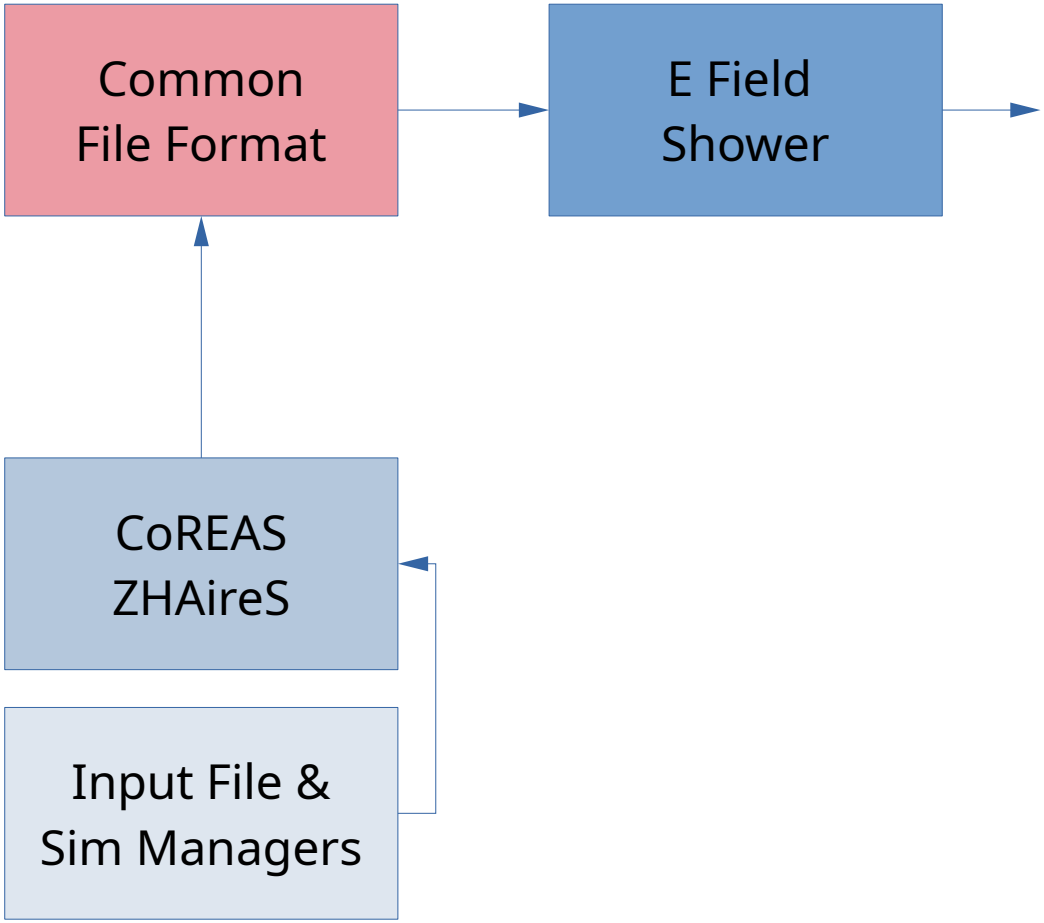

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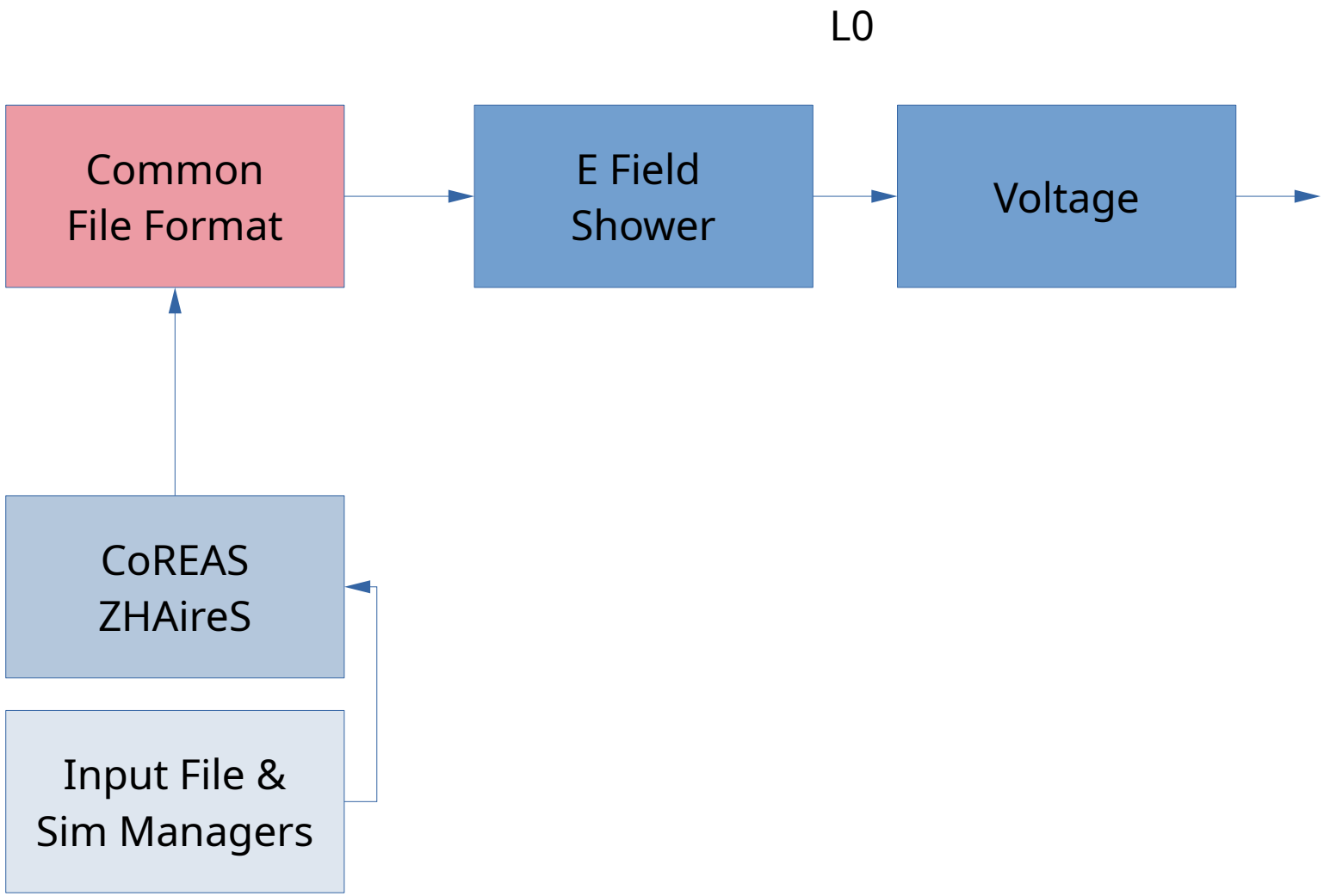

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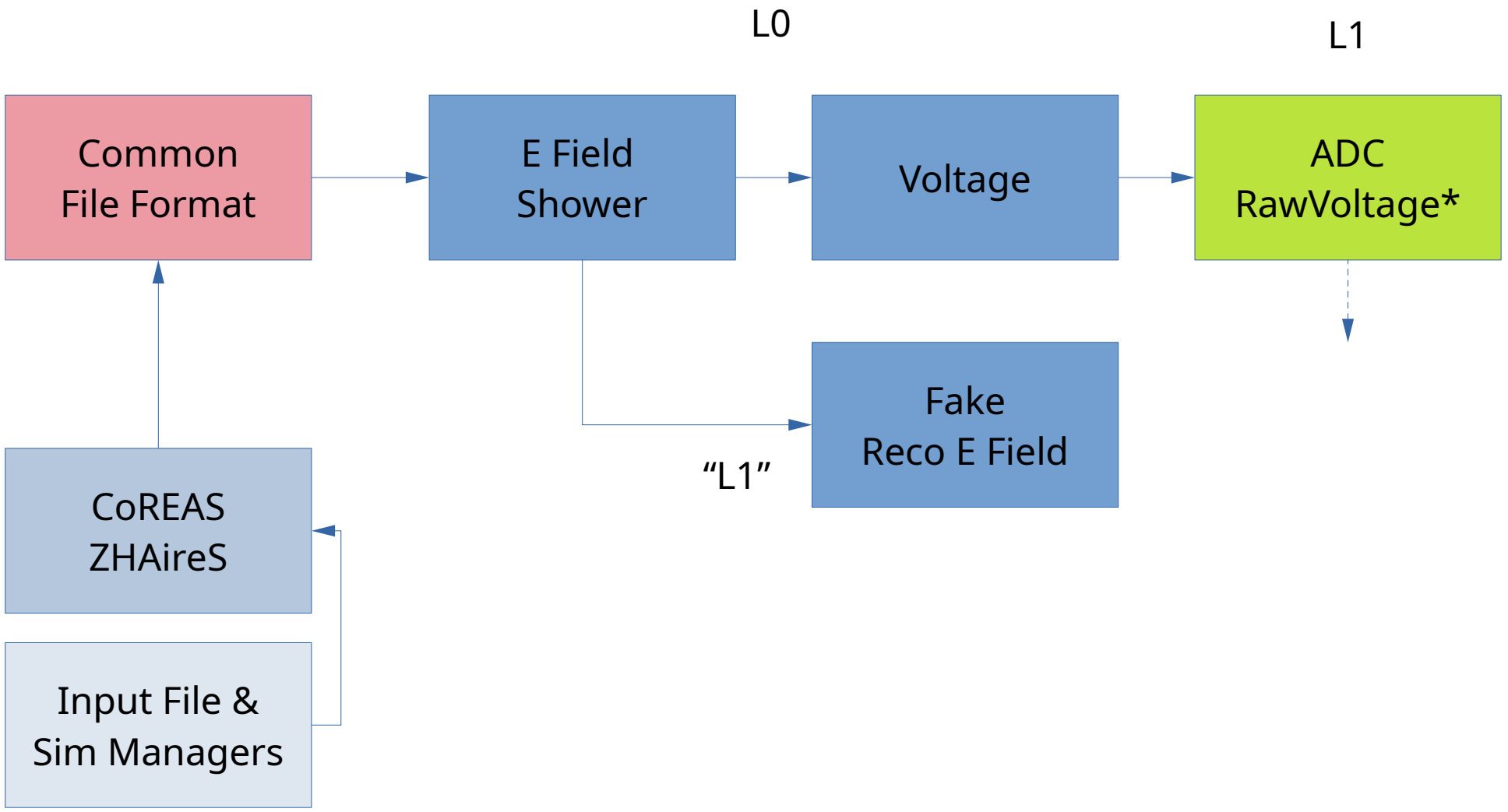

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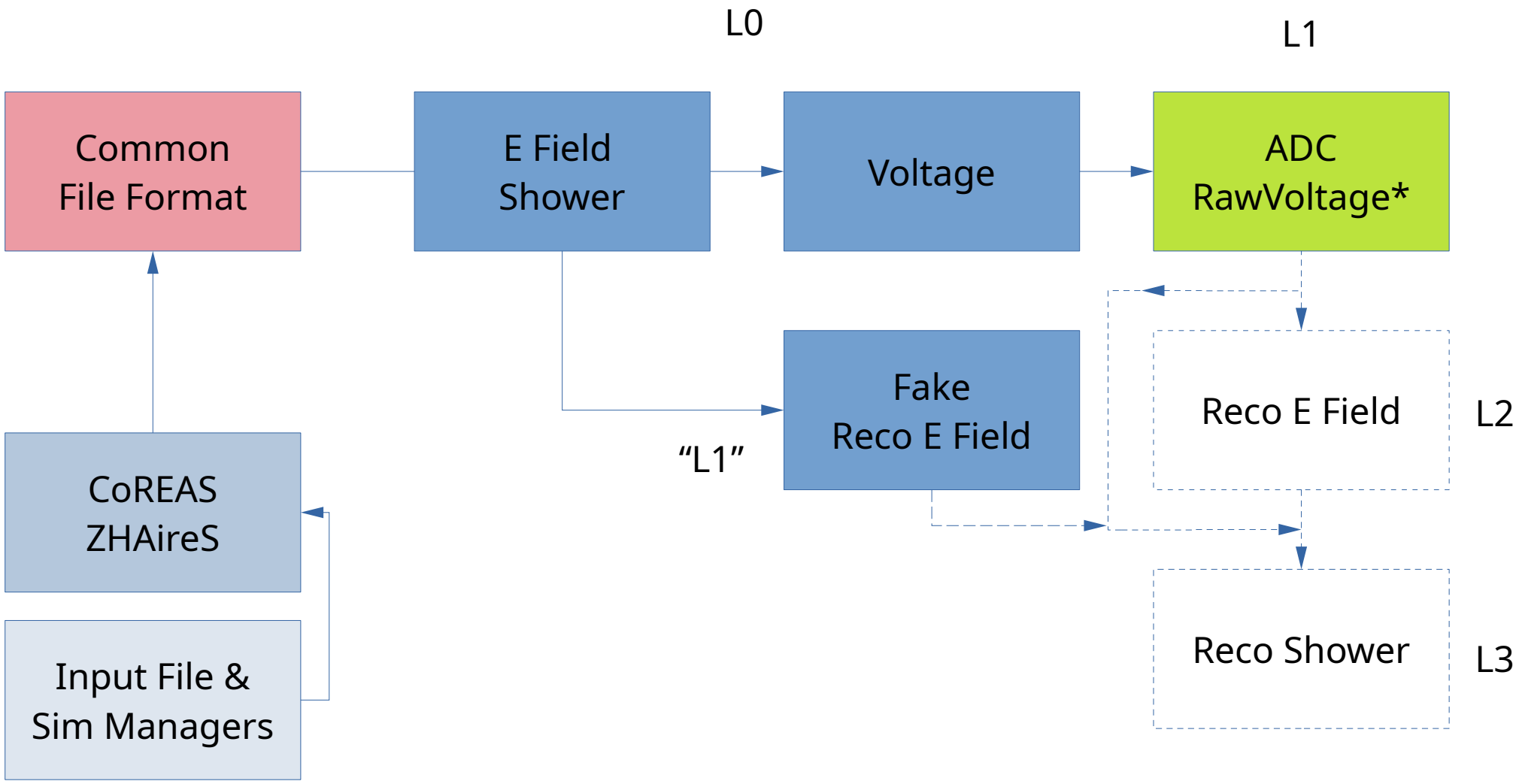

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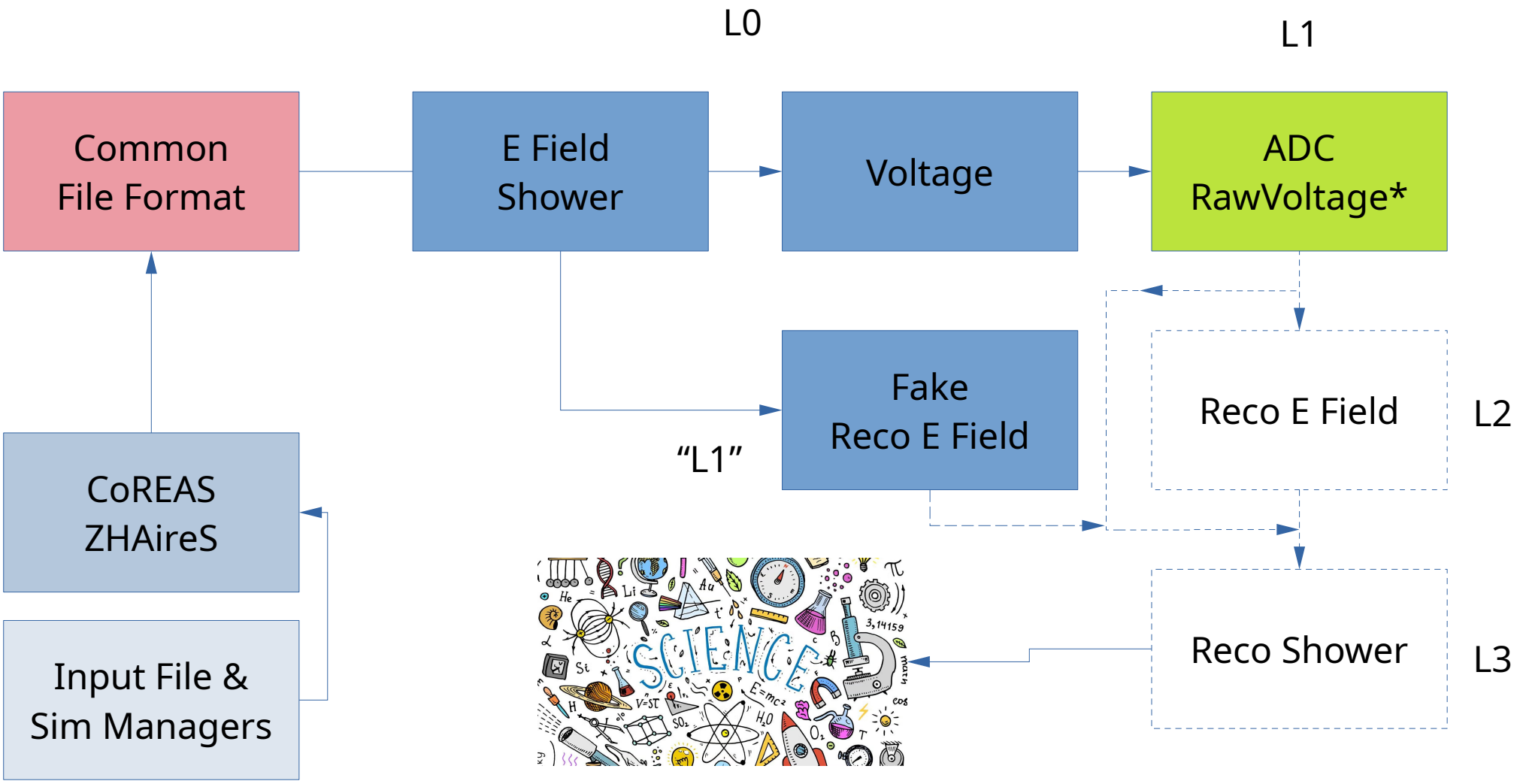

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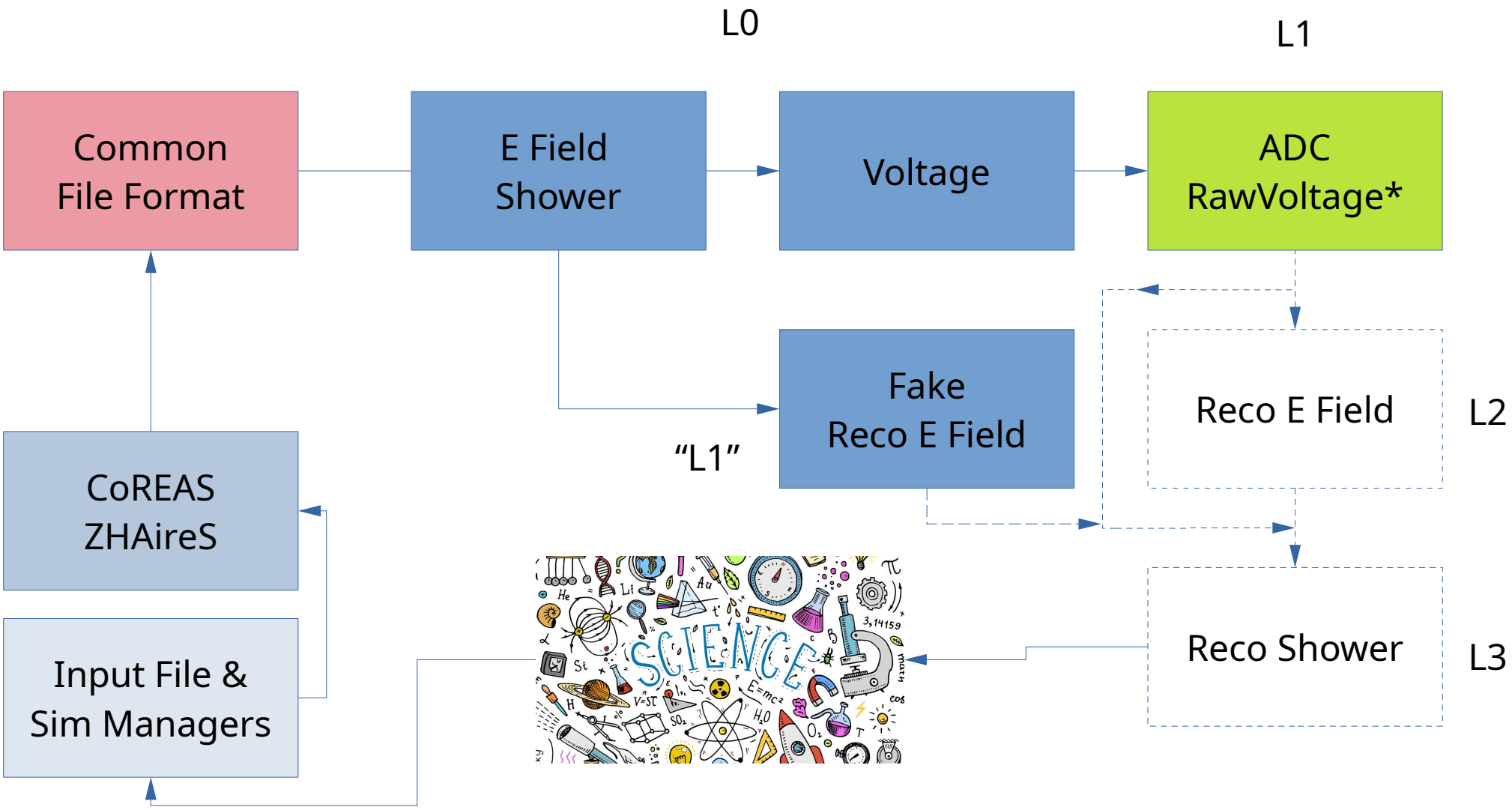

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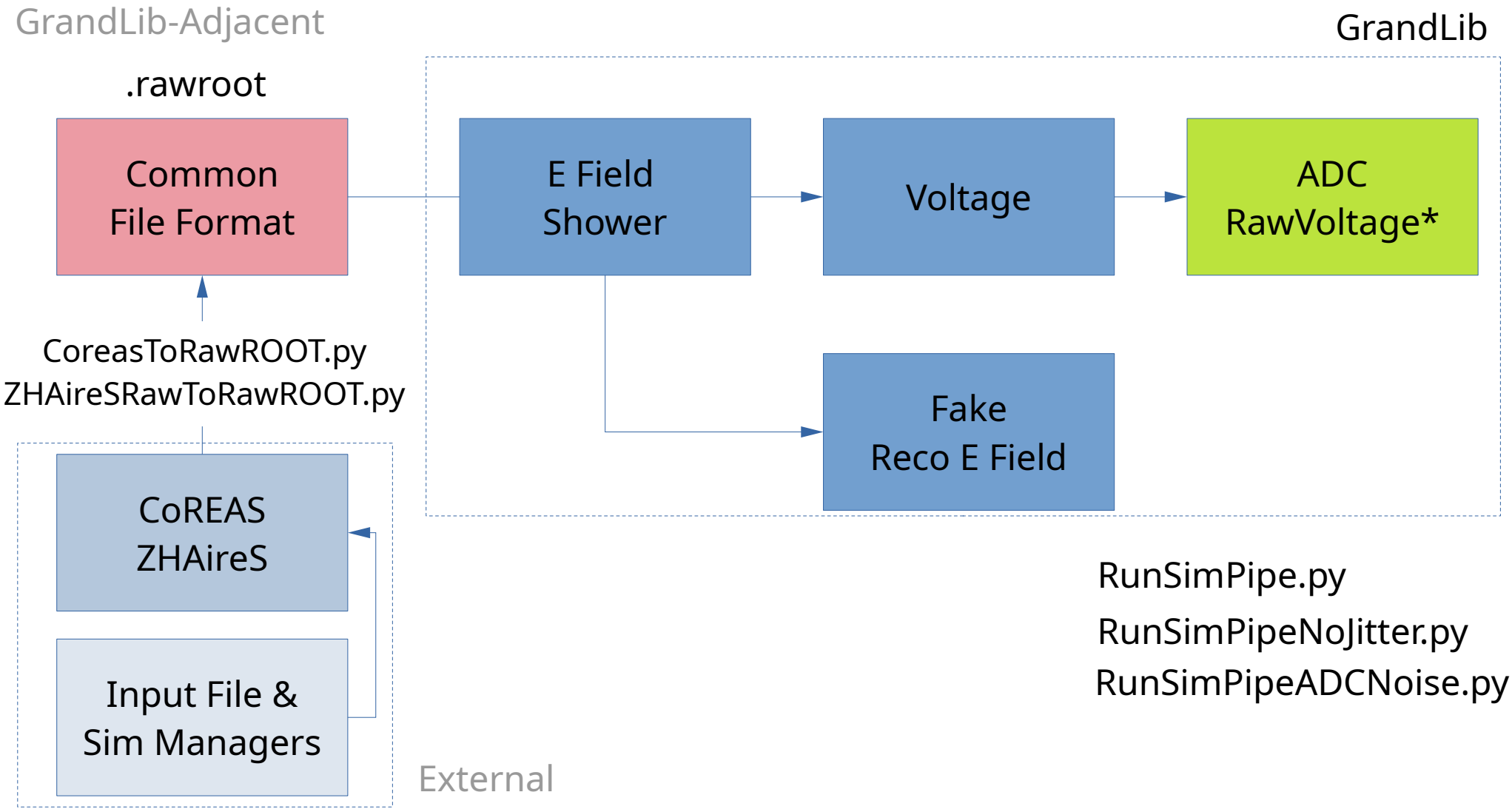
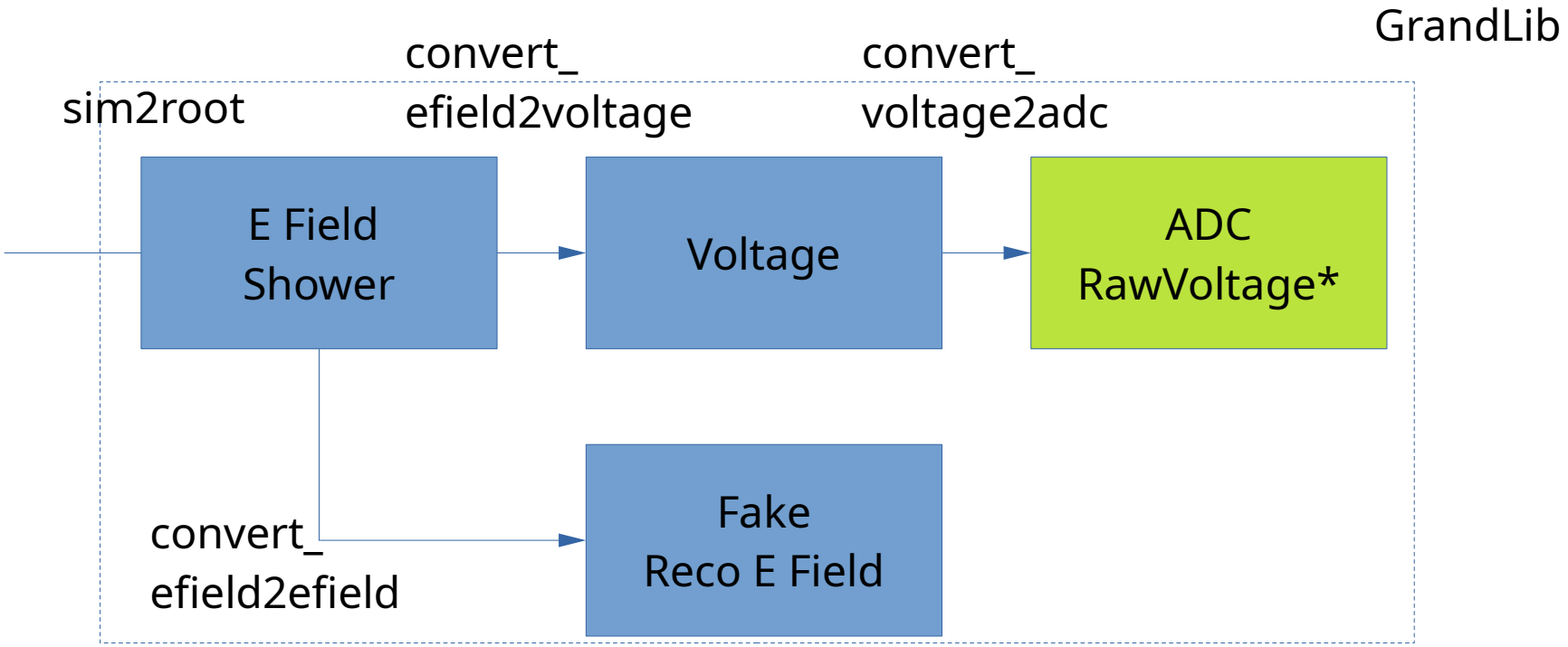


How RunSimPipe works



The order of the scripts is rigid!. Root files cannot be updated, only regenerated

How sim2root works

```
sim2root.py INPUTDIR  --verbose=warning
        --target_duration_us=2.048      #length of the trace
        --trigger_time_ns 550           #where the signal peak will be inside the trace
        -sl  ArrayName                  #the name of the array (site layout)
        -ef 250                         #how many events per file
        -e EXTRA                        #EXTRA thing you want in the filename
                                        sim_Xiaodushan_20221025_220000_RUN0_CD_EXTRA_0000
```

What does it do?

- Read the information on the rawroot file to:
  - adapt sim data to GRAND conventions
  - compute derived quanties not given by the rawroot
  - create L0 run, runefieldsim, rushowersim
  - create L0 showersim
  - create L0 shower
  - create L0 efield

How convert_efield2voltage works

```
convert_efield2voltage  INPUTDIR  --seed 1234 --verbose=warning
        --add_jitter_ns 5                                   #shift the trace to simulate GPS jitter
        --calibration_smearing_sigma 0.075                  #multiply trace amplitude to simulate calibration
        --no_noise                                          #if you don't want galactic noise
```

What does it do?

- Read the information on the efield file (and some others):
  - Apply the antenna response
  - Apply the RFChain
  - Add galactic noise
  - create L0 voltage

How convert_voltage2adc works

```
convert_voltage2adc  INPUTDIR  --verbose=warning
  --add_noise_from directory        #directory where ADC noise traces are (if you want ADC noise)
  --seed 1234                       # random seed
```

What does it do?

- Read the information on the voltage file (and some others):
  - Downsample to 500Mhz
  - create L1 files
  - Add ADC noise if that is what you want (pick at random traces from the noise files)
  - SOON: Create rawvoltage files, delete voltage files ?
  - NEXT: Trigger?

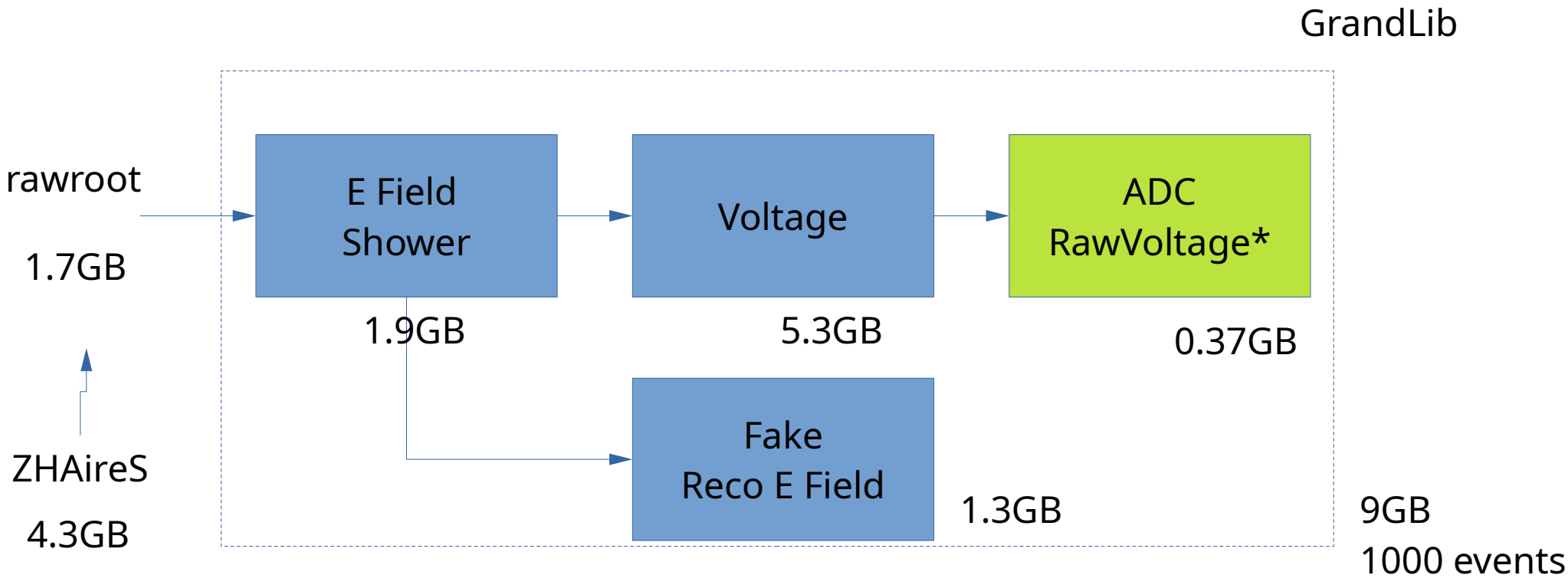
How convert_efield2efield works

```
convert_efield2efield INPUTDIR --verbose=warning
--add_noise_uVm 64                    #gaussian noise added before filtering
--add_jitter_ns 5                     #time jitter
--seed 1234                           #set random seed
--calibration_smearing_sigma 0.075    #amplitude jitter
--target_duration_us 2.048            #track length
--target_sampling_rate_mhz 500        #sampling rate
--no_filter                           #remove the filter (not in use)
```

What does it do?

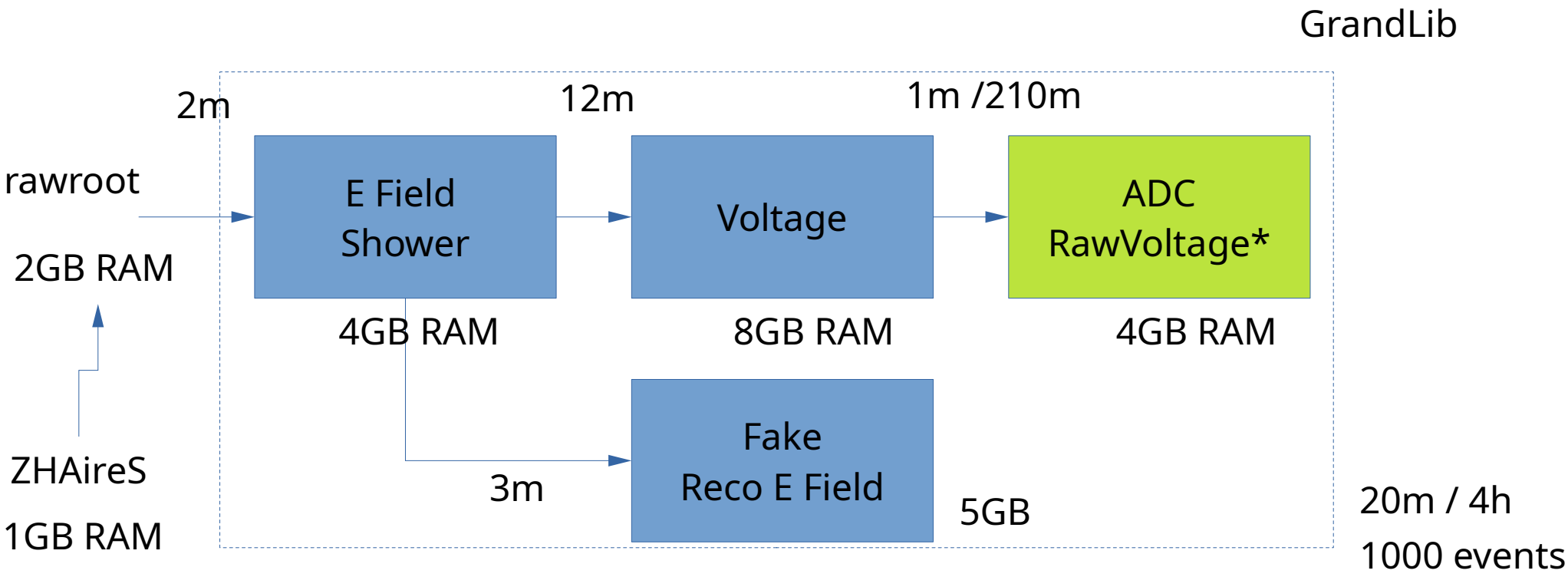
- Read the information on the efield file (and some others):
  - Add Gaussian noise
  - Elliptic Causal Filter 50-200Mhz
  - Downsample to 500Mhz
  - create L1 efield files

How Much Space it takes?



15GB stored per 1000 events! Too much!.
--Get rid of Voltage?

How Much Time and Memory it Takes?



For how RunSimPipe is done, you cannot run in parallel in the same directory
Because of Memory constraints, I run 2000 events at a time
Because I still could not get to run grandlib in lyon, run in my PC → laborur intense