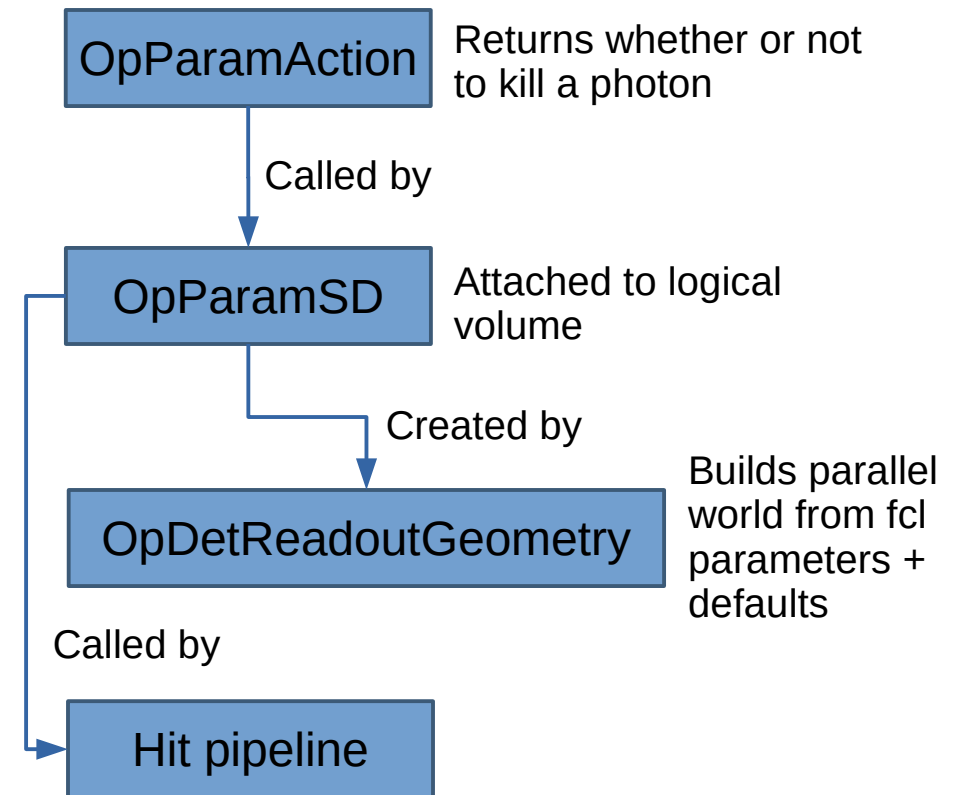


# Possible Issues in larg4::OpDetReadoutGeometry

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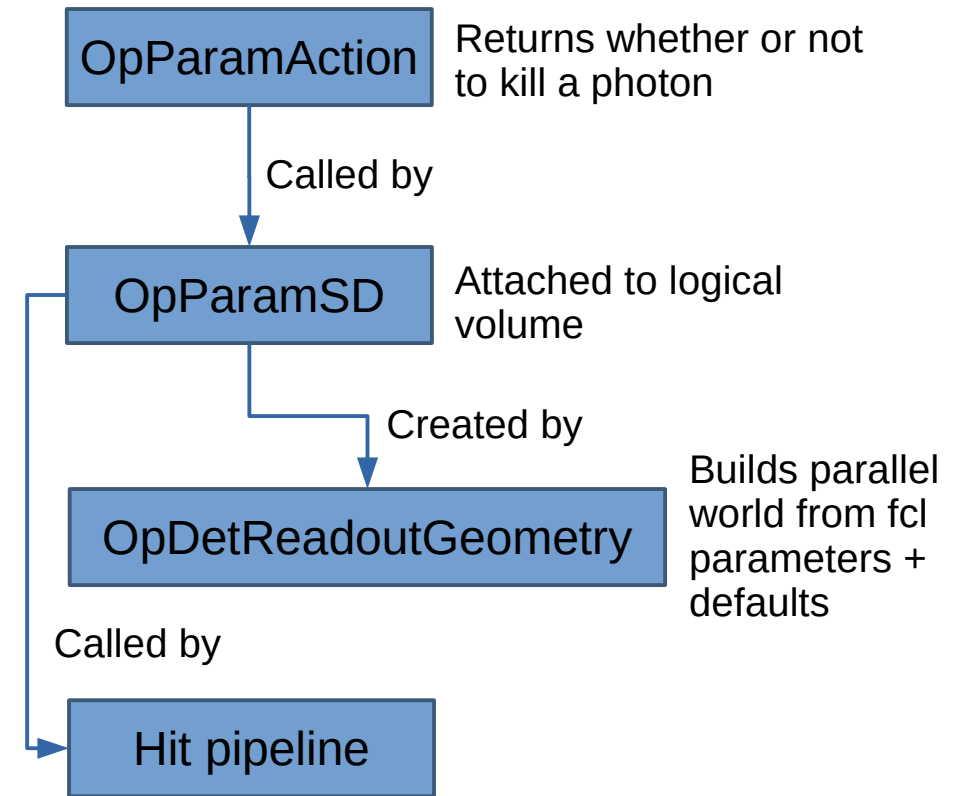
## Background

- I am working to implement wireplane and mesh shadowing in the Monte Carlo
  - There already exists a method for doing this in LarSoft
  - The relevant classes are OpParamAction and OpParamSD
- Simply “turning on” shadowing with the relevant fcl parameters did not work, and I am currently trying to diagnose the problem.
  - I confirmed with the original implementer that what I did should have worked



## Background Continued

- Photon libraries generated on a standard geometry with no additional fcl options are (within statistical error) identical to libraries generated on a standard geometry with the shadowing options turned on
- I took parameters to extremes:
  - I parameterized the entire bulk of the liquid argon on both sides of the APA
  - I set pitch=gauge, which should result in total shadowing
- I also turned statistics up by setting quantum efficiency = 1



## Issue 1- The Uncleared List

- OpDetReadoutGeometry::Construct
  - Latter part of this method deals with the parameterized volumes
  - Loops through volume names specified in the fcl
    - Finds volumes matching the name and adds them to `std::vector<G4LogicalVolume*> OpParamVolumesFound`
    - Then loops through `OpParamVolumesFound` and adds clones of these volumes with attached `OpParamSD`'s and associated `OpParamActions` to the parallel world
  - The bug: `OpParamVolumesFound` is NOT cleared between each volume name, resulting in x volumes found for the first name, 2x for the second, 3x for the third etc
    - This results in duplicate volumes added to the parallel world, some with inappropriate `OpParamActions`
    - In my case, x=6 for unknown reasons
- I doubt this one is causing my problems, but I am pretty sure it would cause problems down the road.

## Issue 1.5- Too Many Volumes

- `OpDetReadoutGeometry::Construct` and `OpDetReadoutGeometry::FindVolumes`
  - Finds 6 volumes for every name of a volume that is actually present in the geometry that I give it
    - Presumably, the intended behavior is to find every volume with that name, and there should only be one of each in most cases
  - I have not looked into this in detail yet, but I can find no obvious cause in `OpDetReadoutGeometry::FindVolumes`

## Issue? 2- No Lookup

- OpDetReadoutGeometry::Construct
  - In line 103 of OpDetReadoutGeometry.cxx, volumes corresponding to sensitive detectors are added to TheOpDetLookup (declared on line 65)
  - In the corresponding part of the code for the parameterized volumes, this is not done
  - I do not fully understand the process by which photons are stepped through the volumes, so I am not sure if this affects the processes by which photons are killed
  - Could this be a problem?
    - My current bet is “no”, but I do not actually know

# Questions, Answers, Suggestions?