# ILD_01 pre-release models in Mokka

ILD Software pre-meeting

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# Pre release versions of model ILD_01

- Model names are: ILD_01pre00, ILD_01pre01 and ILD_01pre01fw
- improvements available:
  - - Improvements of different sub-detector implementations
  - - Mokka kernel improvements

# Sub-detector improvements (I)

- New Ecal with silicon and/or scintillator sensitive layers
- Analog Hcal with electronics inside
- Pad-row-based TPC with Endplate of 25 percent X0
- Improved implementation of Sit, SET, ETD by the SiLC Collaboration
- Ftd - First mechanical design with micro-strips (disks 3,4,5,6,7) and pixel (disks 1,2) technologies by Jordi Duarte.

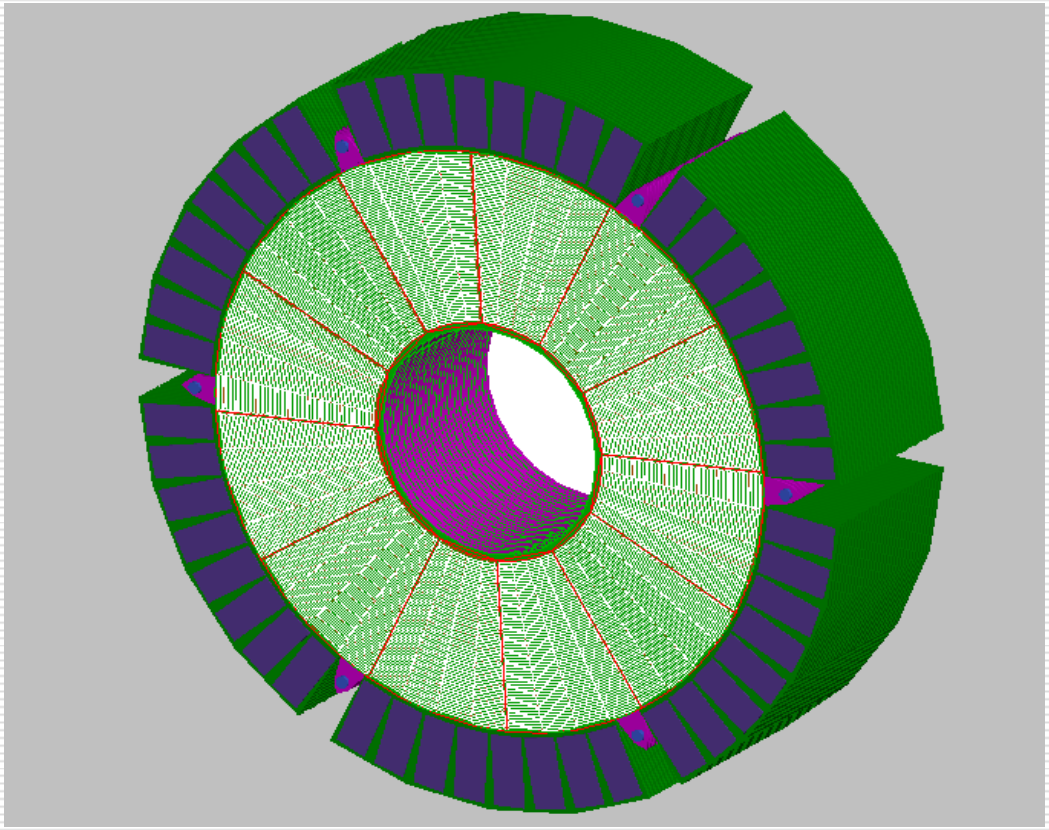
# Sub-detector improvements (II)

- New LumiCal with virtual cells (details from Bogdan Pawlik)
- LHcal implementation, as a Si/W calorimeter
- First implementation of services (cables, cooling, etc)
- Improvements in implementation of Tube, Mask, Yoke (new Muon System), BeamCal, Magnetic field (field depending on the coil and yoke parameters), Coil (using Coil Cryostat with detector instrumentation)

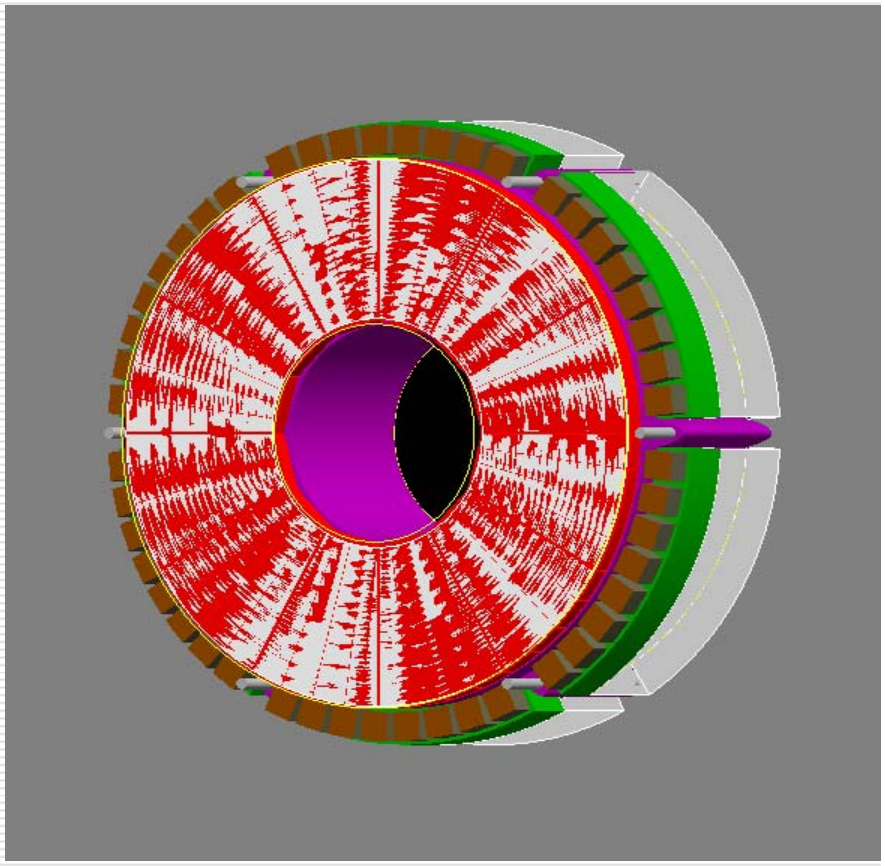
# Sub-detector improvements (III)

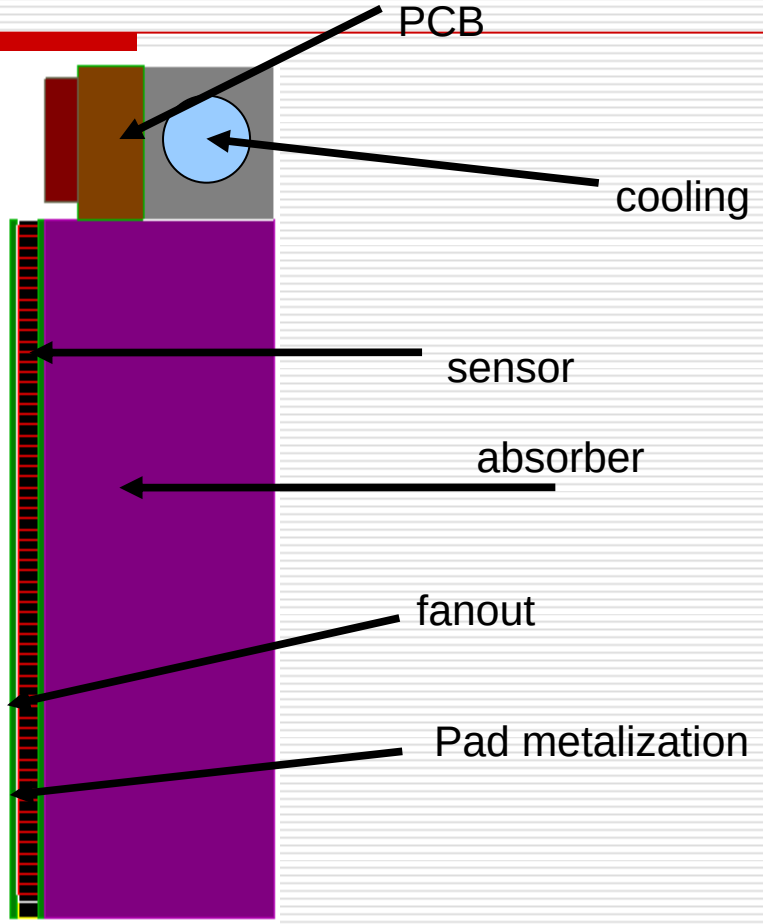
- Available (but not included by default in the new ILD models):
  - improved implementation of digital (GRPC) Hcal (geometry suggested by Henri Videau)
  - new implementation that replaces, in the AHcal, scintillator layers (and their associate components) with GRPC layers (identical to those in the GRPC Hcal), by Ran Han.

# *Status of LumiCal Simulation Software*



# *Implemented Geometry*





# LumiCal Drivers

SLcal03 - LumiCalX01 ( tag mokka-07-02 , Mokka model ILD_01pre00)
tile gaps, pad metalization, support structure, cooling, electronics

LumiCalV -LumiCalV00 ( mokka tag > 07-04, models ILD_01pre01/pre01fw)
as above, instead real cells virtual one are implemented,
Recommended as it saves 30% CPU time

-Both drivers are tested , stable and no changes foreseen
-Bugs : not known
-Ready for massive production

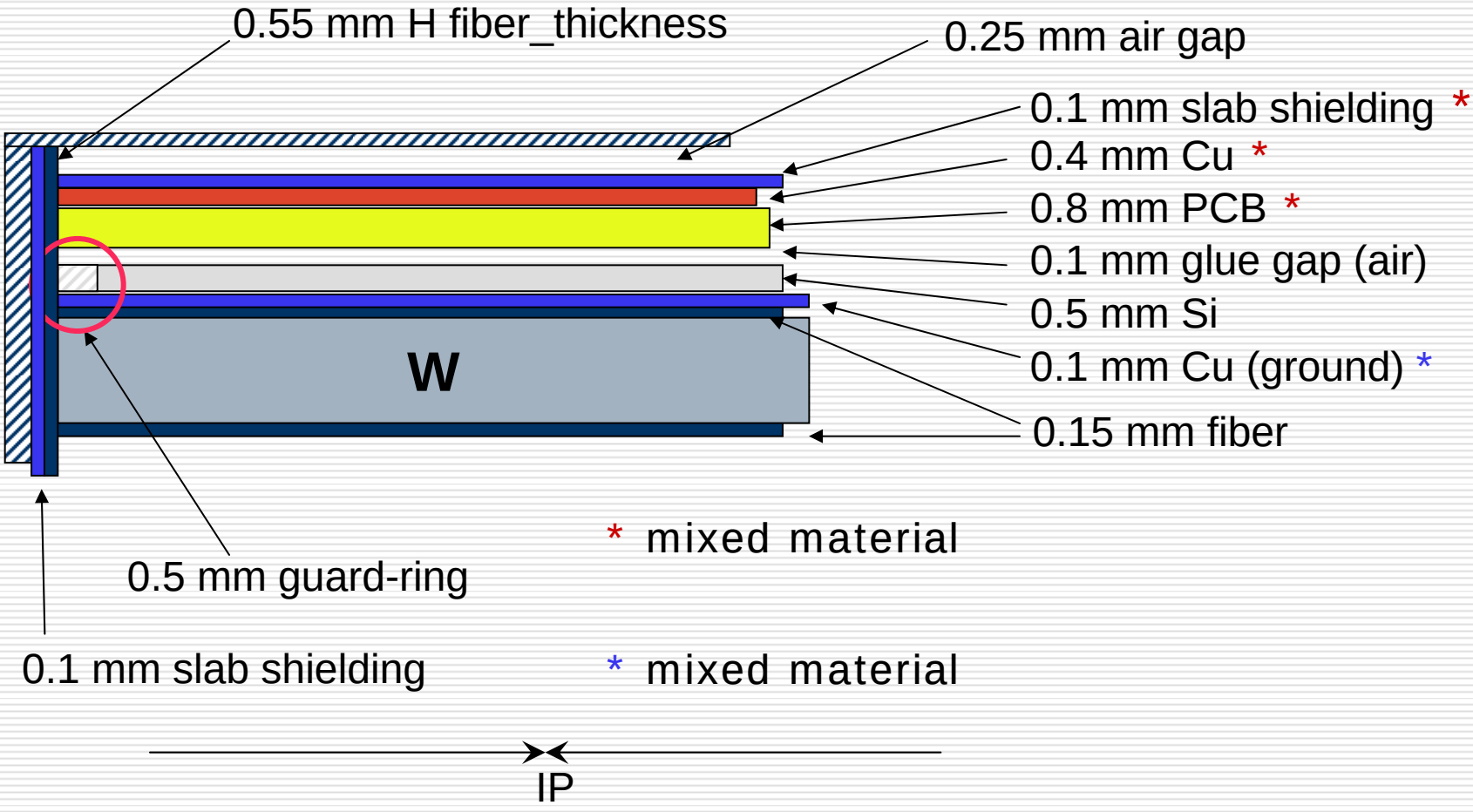
# *Default Parameters*

/Mokka/init/globalModelParameter Lcal_z_begin  2500.
/Mokka/init/globalModelParameter Lcal_inner_radius  77.275
/Mokka/init/globalModelParameter Lcal_outer_radius  196.5
/Mokka/init/globalModelParameter Lcal_extra_size  26.
/M/okka/init/globalModelParameter Lcal_n_layers  30
/Mokka/init/globalModelParameter Lcal_n_tiles  12
/Mokka/init/globalModelParameter Lcal_nstrips_phi  48
/Mokka/init/globalModelParameter Lcal_nstrips_theta  64
/Mokka/init/globalModelParameter Lcal_phi_offset  0
/Mokka/init/globalModelParameter Lcal_sensor_phi_offset 3.75
/Mokka/init/globalModelParameter Lcal_layer_gap  0.1
/Mokka/init/globalModelParameter Lcal_tile_gap  1.2
/Mokka/init/globalModelParameter Lcal_silicon_thickness  0.32
/Mokka/init/globalModelParameter Lcal_support_thickness  0.4
/Mokka/init/globalModelParameter Lcal_tungsten_thickness 3.5

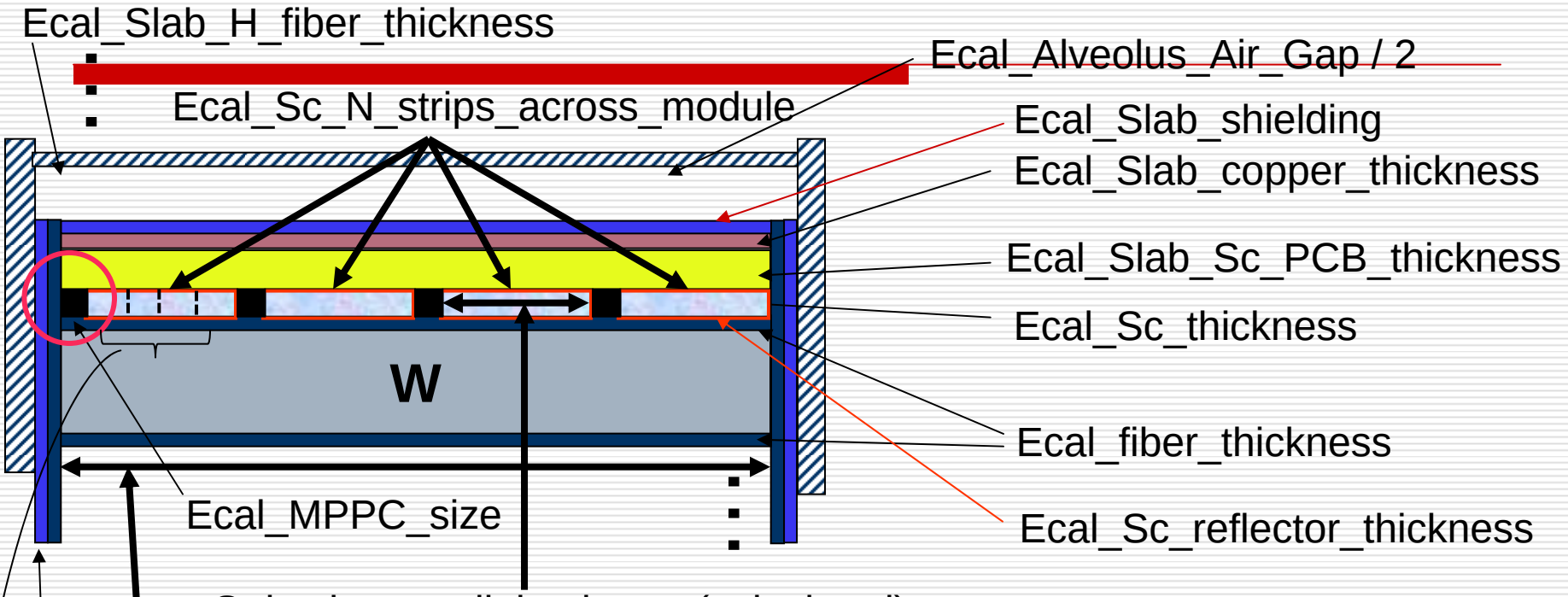
# Silicon & Scintillator Ecal

- Users can mix couples of Scintillator or Si layers (not individual layers), by specifying the value of a global parameter: Ecal_Sc_Si_mix
  - By default ‘all silicon’
  - See release notes for layer parameter encoding
- the same geometry as the 'all silicon' version:
  - the same shapes and dimensions of barrel and endcap modules, towers
  - only the 'H structures' are filled with different sensitive materials and related ingredients

# Si layers: Alveoli & “H” slab structure



# Parameters for Alveoli & “H” slab structure for Sc strips, Z direction (parallel to beam)




Strip size parallel to beam (calculated) =
(Inner “H” size / Ecal_Sc_N_strips_across_module) - Ecal_MPPC_size

Inner “H” size = the same value calculated for the Si “H”

Ecal_Slab_shielding (here implemented as fiber in vertical)

Cells in Z = Ecal_Sc_number_of_virtual_cells (for every strip)

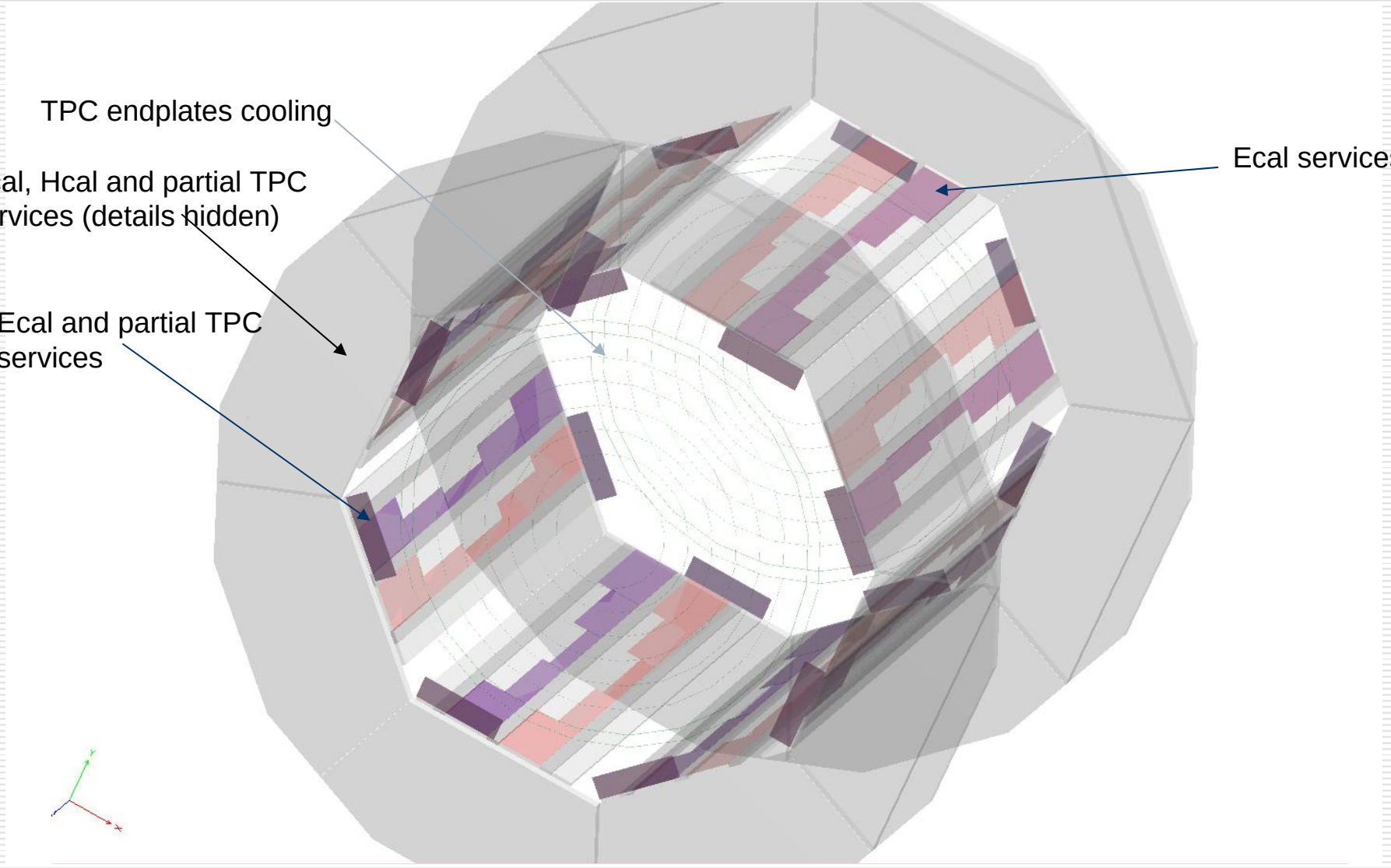
# Implementation of services

**The implementation follows the plans drawn by the integration group**

**(received from Catherine Clerc and Angela Lucaci)**

- Gap between barrel Ecal and barrel Hcal
- Gap between barrels and endcaps
  - Services in the Ecal and Hcal zone
  - TPC endplates cooling

# Implementation in Mokka: view of all implemented services



# Mokka kernel improvements (I)

- Bug fix concerning the use of the lifetime of the pre-defined decays given by the stdhep files:
  - information available in the event file, but was not taken into account by Mokka
  - fix implements exactly the same as the SLIC code : the difference in time between the mother and the first daughter creation is used to calculate and set up the mother proper time.
  - insures that the intermediate particle is propagated for that length of time and the (predefined) daughters are created at that time, with modifications to account for change in direction and energy loss.

# Mokka kernel improvements (II)

- another bug was fixed concerning the lifetime of certain particles, including b-baryons:
  - they were not known to Mokka/G4, and so their flight length was previously ignored.
  - the fix again follows the SLIC implementation: reading a text file which contains a list of particles. Any particle not known to Mokka is added to the table of known particles, also defining their material interaction.
  - the default filename is particle.tbl (configurable via the command /Mokka/init/PDGFile), which is now included in the Mokka distribution.