HCAL/ECAL Reco on GPU

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Dario Mapelli, Giacomo Cucciati (ECAL) Mariarosaria D'Alfonso (HCAL) Ahmad Hesam (OPL), Viktor Khristenko (IT)

Problem Definition

Port existing Hcal/Ecal Reconstruction workflow onto the GPU

- Understand current regression procedure
- Conditions
- Event Data

Pseudo Reconstruction (hcal)

What we have:

```
for (channel : channels) {
  auto cond = get_conditions();
  auto chinfo = adapt_to_info(channel, cond)
  reconstruct(chinfo)
}
```

What we want:

```
reconstruct_on_GPU<<<thread_organization>>>(channels);
```

Cholesky Decomposition

Implemented: cholesky_decomp_gpu(Eigen::Matrix<double, 10, 10>)

Using cuSolver library: cusolverDnDpotrf

$$\begin{pmatrix} 4 & 12 & -16 \\ 12 & 37 & -43 \\ -16 & -43 & 98 \end{pmatrix} = \begin{pmatrix} 2 & 0 & 0 \\ 6 & 1 & 0 \\ -8 & 5 & 3 \end{pmatrix} \begin{pmatrix} 2 & 6 & -8 \\ 0 & 1 & 5 \\ 0 & 0 & 3 \end{pmatrix}$$

Future Plans

Continue porting

Many thanks for organizing!