

Task 2.2 report

Federico Meloni (DESY)

Detector and MDI meeting, 16/05/2023



Mandate and scope (reminder)

Task 2.2 Design and implementation of event reconstruction algorithms in 5D at $\sqrt{s}=3$ TeV and $\sqrt{s}=10$ TeV (DESY)

This task will focus on developing reconstruction algorithms exploiting 3D position, energy, and timing measurements to mitigate beam-induced background and perform tracking and calorimetry clustering. Leveraging on the developments made for future colliders, this task will explore machine learning solutions and parallel computing, both for real-time event processing and for offline analysis, taking into account the specific challenges of a muon collider (e.g., particle tracking in the forward region).

Table 3.1b.2: WP2 - Workpackage description

Work package number	2	Lead beneficiary						UNIPD	
Work package title	Physics and Detector Requirements								
Participant number	8	1	6	5	2	18	10		
Short name of participant	UniPD	CERN	INFN	CEA	DESY	UOS	LIP		
Person months per participant:	24	0	12	12	12	12	12		
Start month	1			End month	48				

Planning

If you are receiving funds to contribute to WP2 and plan to work on event reconstruction, please get in touch with your rough plans **before the IMCC annual meeting** in June

- I'll be getting a direct ping at the beginning of June if you didn't act before

Goal is to collect ideas and planned contributions so that we can embed them into the overall IMCC activities coordinated by Lorenzo and Massimo

Ongoing activities

1. PhD student at DESY (David Spataro) started looking into 4D pattern recognition with quantum algorithms
 - Aiming to report plans and early findings on 30th of May
2. I started looking at the calorimeter digitisation in view of enabling 5D reco there (discussions with Lorenzo, Massimo, and some key4hep experts in progress)

Goals:

- Make more modular (not a single processor for all calos)
- Improved treatment of BIB pile-up in cells

Progress:

- More granular realistic digi processor exists already (RealisticCaloDigi)
- Pile-up of hits in calo cell not necessarily correctly treated
- I think there is a case for overlaying pre-digitised BIB hits
- Collecting findings, aiming for a report in a few weeks

Task 2.2 - related jobs

Can fund fraction of a DESY fellow via MuCol

- If you are interested, get in touch!

Are you opening a position based on MuCol funds?

Please get in touch, I'll advertise it here!

Thank you!