**Name of the project: FLOMOTION**

**Table 3.1c: List of Deliverables[[1]](#footnote-0)**

Only include deliverables that you consider essential for effective project monitoring.

| **Number** | **Deliverable name** | **Short description** | **Work package number** | **Short name of lead participant** | **Type** | **Dissemination level** | **Delivery date**  **(in months)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1.1 | Low pT tracking at the extremes | General purpose reconstruction code for low pT tracks in high multiplicity events and high pile-up environments |  | CERN | OTHER | PU | M18 |
| 1.2 | Parallelised low-pT tracking algorithms | GPU (HIP/CUDA/OneAPI) porting of the code developed for the reconstruction of low-pT tracks |  | CERN | DEM | PU | M36 |
| 2.1 | Looper topology reconstruction in ion-ion collisions | Extension of the low pT tracking to include charged particle tracks that curl several times in the detector’s magnetic field when reconstructing the complex event topologies produced in ion-ion collisions. |  | Austrian Academy of Science | DEM | PU | M36 |
| 2.2 | Generic decay topology reconstruction integration with tracking | Building upon advances in tracking, the goal is to incorporate the reconstruction of intricate multi-particle topologies into the tracking algorithms, creating a flexible framework that can be applied across different experimental setups. |  | Austrian Academy of Science | OTHER (Software) | PU | M48 |
| 3.1 | Integration of PID measurement in tracking with momentum refitting | The objective is to integrate PID directly into the tracking, with the flexibility to incorporate different detector information (dE/dx, TOF, TRD), enabling momentum refitting and providing a more accurate description of particle trajectories. |  | INFN | OTHER | PU | M24 |
| 3.2 | Use of trajectory modifications to identify particles | Explore the use of trajectory modification to identify particles, leveraging the fact that even small deflections in a particle’s path as it crosses successive detector layers can be exploited to estimate its specific energy loss, and thereby determine its identity. |  | INFN | DEM | PU | M48 |
| 4.1 | Setup of the project | Organise an initial workshop where the work packages are established and the deliverables are distributed according to the availability of the involved people |  | INFN/CERN/Austrian Academy of Science | DMP | PU | M6 |
| 4.2 | Final FLOMOTION Software Framework | Integrated release including geometry, tracking, topology, and PID modules |  | CERN | OTHER (Software) | PU | M48 |
| 4.3 | Report on Validation with Physics Cases | Benchmarking performance on heavy-ion observables (multi-charm baryons, dileptons) |  | INFN | R | PU | M48 |

| **KEY**  Deliverable numbers in order of delivery dates. Please use the numbering convention <WP number>.<number of deliverable within that WP>.  For example, deliverable 4.2 would be the second deliverable from work package 4.  **Type:**  Use one of the following codes:  R: Document, report (excluding the periodic and final reports)  DEM: Demonstrator, pilot, prototype, plan designs  DEC: Websites, patents filing, press & media actions, videos, etc.  DATA: Data sets, microdata, etc.  DMP: Data management plan  ETHICS: Deliverables related to ethics issues.  SECURITY: Deliverables related to security issues  OTHER: Software, technical diagram, algorithms, models, etc.  **Dissemination level:**  Use one of the following codes:  PU – Public, fully open, e.g. web (Deliverables flagged as public will be automatically published in CORDIS project’s page)  SEN – Sensitive, limited under the conditions of the Grant Agreement  Classified R-UE/EU-R – EU RESTRICTED under the Commission Decision No2015/444  Classified C-UE/EU-C – EU CONFIDENTIAL under the Commission Decision No2015/444  Classified S-UE/EU-S – EU SECRET under the Commission Decision No2015/444  **Delivery date**  Measured in months from the project start date (month 1) |
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**Table 3.1d: List of milestones**

| **Milestone number** | **Milestone name** | **Related work package(s)** | **Due date (in month)** | **Means of verification** |
| --- | --- | --- | --- | --- |
| M1 | Project kick-off and work package setup |  | M6 | Kick-off workshop held; work packages assigned; Data Management Plan finalized. |
| M2 | First Low-pT tracking demonstrator |  | M18 | General purpose reconstruction code for low-pT tracks zsuccessfully runs on simulated high-multiplicity events. |
| M3 | PID-aware Tracking Prototype |  | M24 | Prototype PID-aware tracking module (dE/dx, timing); tested with simulated data and validated against Monte Carlo truth |
| M4 | Looper reconstruction implemention |  | M36 | Prototype algorithms for looper reconstruction integrated in the framework; successful validation on MC simulation datasets. |
| M5 | Harmonization and collaboration between WPs and institutes |  | M6/M18/M36 | Cross-WP workshop; coordination meetings between participating institutes. |
| M6 | Dissemination of intermediate results |  | M24/M36/M48 | Dissemination of intermediate results through presentations at conferences and collaboration meetings /public notes. |
| M7 | Demonstrator for parallelised low-pT tracking algorithms |  | M36 | Parallelised tracking algorithms ported to GPU and validated on high-multiplicity simulation datasets; performance benchmark report delivered. |
| M8 | Generic decay topology reconstruction integration |  | M48 | Integration of multi-particle decay topology reconstruction into the tracking framework; validated on benchmark heavy-ion physics cases (e.g. charm baryons); technical note and code release delivered. |
| M9 | Final Integrated FLOMOTION Software Release |  | M48 | Public release of the complete software framework (geometry, tracking, topology, PID) in repository; final validation report delivered. |

| **KEY**  **Due date**  Measured in months from the project start date (month 1)  **Means of verification**  Show how you will confirm that the milestone has been attained. Refer to indicators if appropriate. For example: a laboratory prototype that is ‘up and running’; software released and validated by a user group; field survey complete and data quality validated. |
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**Table 3.1e: Critical risks for implementation**

| **Description of risk (indicate level of (i) likelihood, and (ii) severity: Low/Medium/High)** | **Work package(s) involved** | **Proposed risk-mitigation measures** |
| --- | --- | --- |
| Difficulty in achieving robust reconstruction of very low-pt tracks in dense, high-multiplicity environments and high pile-up environments. (Likelihood: medium, Severity: high) |  | Benchmarking against existing specialised tracking implementations with a current experimental layout; iterative prototyping with simulated heavy-ion datasets; fallback to simplified reconstruction modes if needed. |
| Algorithms may become computationally expensive when scaling to high-multiplicity, high pile-up ion-ion collisions.  (Likelihood: medium, Severity: high) |  | Continuous profiling and optimization; parallelization; use of HPC techniques; modular design to allow less demanding options when necessary. |
| Risk that integration with available general purpose tracking frameworks presents unforeseen compatibility or maintenance challenges.  (Likelihood: medium, Severity: medium) |  | Close collaboration with external developers; early proof-of-concept prototypes; maintain modularity to allow fallback to independent modules, yet generic, modules. |
| Algorithms may not reach required accuracy for PID (e.g. PID via trajectory modification) or reconstruction of weak decays.  (Likelihood: medium, Severity: high) |  | Early validation with Monte Carlo truth; cross-checks with existing detector data and established PID methods; integration with traditional PID if standalone identification underperforms. |

| **Definition critical risk:**  A critical risk is a plausible event or issue that could have a high adverse impact on the ability of the project to achieve its objectives.  **Level of likelihood to occur: Low/medium/high**  The likelihood is the estimated probability that the risk will materialise even after taking account of the mitigating measures put in place.  **Level of severity: Low/medium/high**  The relative seriousness of the risk and the significance of its effect. |
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1. You must include a data management plan (DMP) and a ‘plan for dissemination and exploitation including communication activities as distinct deliverables within the first 6 months of the project. The DMP will evolve during the lifetime of the project in order to present the status of the project's reflections on data management. A template for such a plan is available in the [Online Manual](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/om_en.pdf) on the Funding & Tenders Portal. [↑](#footnote-ref-0)