

Addendum to the Executive Summary of nuSTORM at CERN

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The full author list is presented to indicate the community that is interested in the implementation and exploitation of nuSTORM.

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2 Time-line

The recent efforts to examine the possibility of siting nuSTORM at CERN represent a preliminary feasibility study on limited resources. If the initiative was to be taken further, one might envisage a suitably resourced feasibility study towards a conceptual design report (CDR) over a two-year time-frame. Of note is the considerable work that has already been performed on the concept. The goal of this CDR phase would be to deliver detailed designs and specifications for all key packages. Namely:

- Extraction and beam-line;
- Target/horn and target complex and secondary particle transport;
- Muon decay ring and beam-line elements, in particular the magnets; full simulation of beam dynamics in the capture, transport and storage ring would need to be performed; finalise ring optics and layout;
- Complete civil engineering evaluation; and
- Detailed costing.

The further development of the project after the CDR phase is sketched in table 1.

Table 1: Outline of a possible nuSTORM time-line.

Year	Objective
0 – 2	Detailed designs and specifications Finalise ring optics and layout Preliminary infrastructure integration & CE designs Preliminary cost estimates and schedule
End 2	Delivery of Conceptual Design Report
3 – 4	Continued design studies and prototyping of key technology
End 4	Approval to go ahead with TDR
5 – 6	Engineering design studies towards TDR Specification towards production CE pre-construction activities
7	TDR delivery
8	Seek approval
8+	Tender, component production, CE contracts

3 Construction costs

A first cut cost estimate has been performed as part of the preliminary study. Given resource constraints, it was necessary to rely on a number of sources as the Basis of Estimate, including a well-developed study performed at FNAL in 2013 [1], which included a detailed cost breakdown.

The primary beam line and CE work packages received an itemised evaluation based on best practice and experience at CERN in 2018. The target, target hall, proton absorber and near detector hall estimate were based on a detailed study performed by the CENF study team. The muon decay ring figures were scaled from the values presented in the FNAL study.

The overall material cost estimate, not including a far detector facility to serve a light-sterile-neutrino search, is of order 160 MCHF. The cost of the civil engineering (48 MCHF) and the primary beam line (21 MCHF) is included in this total.

In comparison, the FNAL summary base cost with no contingency, again excluding the far detector, was 184 FY2013 dollars. The FNAL estimate included all personnel costs, fully burdened.

- [1] D. Adey et al. “nuSTORM - Neutrinos from STORed Muons: Proposal to the Fermilab PAC”. In: (2013). arXiv: 1308.6822 [physics.acc-ph].