Appendix A: Interested community

Namelist on the Expression of Interest SPSC-EOI-018

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Appendix B: Schedule and cost

1. Electron beam facility

The eSPS facility, i.e. the linac, transfer lines, SPS adaptations and experimental area, has been preliminarily costed. Most of these costs estimates are based on existing components available in industry (for example for the RF power components) or standard rates (for example for another main cost item, civil engineering).

The top level cost summary is shown in Table I below. The dominant overall cost items are RF power units, klystron and modulators, adding up to close to 30% of the overall cost. Prototyping of higher efficiency X-band klystrons during 2019-20 will be important to minimize these costs. Figure 7 shows the breakdown of the costs as a pie chart for the most diverse PBS node, covering beam transfer to and from the SPS, injection, acceleration and extraction. This chart is based on a summary of 80 sub-items costed separately and grouped according to technical domains. As a reference is worth noting that in the seven year period 2011-2017 CERN invested 95 MCHF of its material budget in developing the CLIC technology and associated project plan. Additionally contributions from the CLIC collaborators, currently 50 institutes, during this period are not included in this sum.

TABLE I: Cost summary

PBS	Item	Cost MCHF
1.1	Source	6.0
1.2	X-band linac	34.1
2.1	Linac to SPS transfer	4.6
2.2	SPS fast injection	3.4
2.3	SPS ring	10.5
2.4	SPS slow extraction	3.3
2.5	Transfer SPS to Exp. Area	4.2
3.2	Civil Engineering	11.4
3.3	Exp. Area infrastructure	2.0
	Sum	**79.5**

A first schedule for the project has also been established and is shown in Figure 8. The schedule drivers are: the project approval time; linac construction and commissioning; SPS adaptations and tests; construction of the experimental hall/area; and connection to it from the extraction tunnel. The schedule is technically based and assumes that important investments for the project implementation can be made from 2020 with significant deliveries and payments from 2021. Additionally the schedule attempts to avoid conflicts with the LHC programme making final connections after the 2023 run.

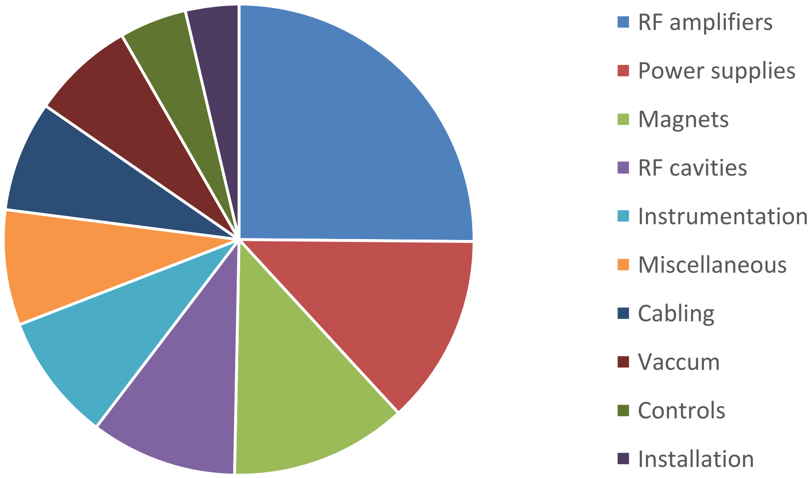

FIG. 7: The cost breakdown for PBS level 2.n.m as an illustration of detail level at this time. These technical domain sums are the results of costing 80 individual sub-components for this PBS level.

2. LDMX

The costing of LDMX is not completely finished and depends e.g. on availability of institutional manpower. From the information gathered so far, it seems clear that the total cost, excluding computing, will not exceed 10 MCHF.

A rough overall schedule can be seen in Figure 9. The preliminary design has been done and is reported in Ref [18]. Prototyping and finalizing design would take about a year. We expect that the R&D and design work on the challenges of phase-2 with a higher beam current, will be pursued in parallel with the construction, installation, commissioning, and phase-1 operation.

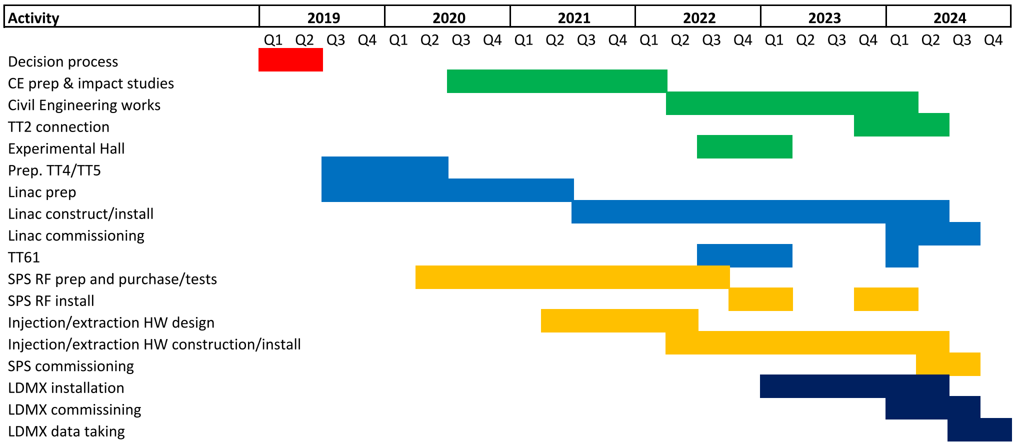

FIG. 8: A possible eSPS implementation schedule. The estimates are technically based. Significant spending on components for the facility will start in 2021. At this time the scheduling of the SPS interventions are indicative over several possible shutdown periods. The final connections will take place at the end of the LHC run in 2023 to avoid conflicts with the LHC programme. LDMX can start beam commissioning and data-taking in 2024.

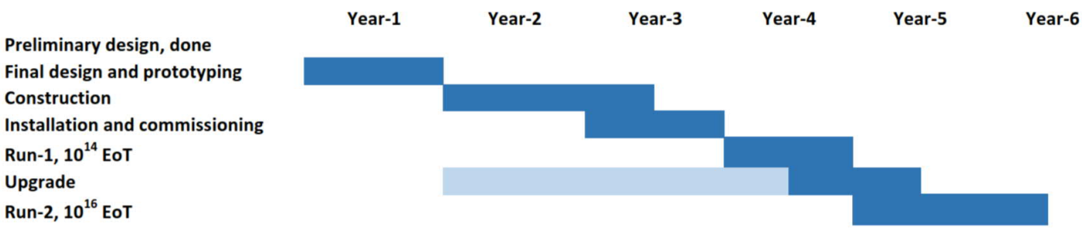

FIG. 9: Outline of possible LDMX deployment schedule

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