

Comments for the DRD2 Draft Proposal ([link to proposal](#))

Please enter below your comments, ideally with your name and email for potential clarifications.

Alternatively, if you would prefer to share your comments more privately, contact directly the Team Leaders of the sections/groups that the comments refer too ([see list here](#)) or contact Roxanne Guenette (roxanne.guenette@manchester.ac.uk) and Jocelyn Monroe (jocelyn.monroe@rhul.ac.uk) directly.

Comments:

1. Luca Scotto Lavina (scotto@lpnhe.in2p3.fr):
 - a. ~~Page 1, broken link to a section (look for “??” in the text)~~
 - b. ~~In table 2: Lavina Luca → Scotto Lavina~~
 - c. ~~Table 2 shows only family names, while other tables like the table 6 shows both names and surnames. Better to uniform the style. (JRM: I think this is complete)~~
2. José I. Crespo-Anadón (jcrespo@ciemat.es):
 - a. ~~Table 6: some institutions appear twice with different PIs, while in other tables the format followed is a single row with several PIs listed.~~
 - b. ~~Some institution tables are listed following alphabetical order, others seem to be randomly ordered (JRM: sorted)~~
3. Margherita BUIZZA AVANZINI (buizza@lir.in2p3.fr)
 - a. ~~First of all thanks for the overall work in putting together the document!~~
 - b. ~~In Section 2.4.3 I would put a bit more information and references about ongoing Water Cherenkov experiments. So I would add an explicit reference to Hyper-Kamiokande after mentioning SuperKamiokande. Concretely, after “For the water Cherenkov detectors, it is Super-Kamiokande, holding 22.5 kton and using PMTs as well” I would add “and the community is preparing for the Hyper-Kamiokande detector that will be up to 8 times bigger, using high quantum efficiency PMTs for the light readout”~~
 - c. ~~In Section 3, I would mention the Water Cherenkov Test Experiment (WCTE) among the large common test facilities. Concretely, after the last paragraph speaking about ProtoDUNE, I propose to add “In the context of Water Cherenkov experiments, the Water Cherenkov Test Experiment (WCTE) is currently in construction at CERN and is expected to operate in the East Area T9 beam line with low momentum particle fluxes (pions, muon, electrons,...). The WCTE is expected to act as a technology and physics demonstrator for Hyper-Kamiokande and its Intermediate Water Cherenkov Detector (IWGD) but could also run for new future Water Cherenkov projects (ESSnuSB) and represents a good opportunity for the DRD2 collaboration”~~
 - d. ~~Still in Section 3, among the “Common simulation tools” I would add a reference to Water Cherenkov tool as WGSim: “Regarding water Cherenkov detector, the~~

~~open-source WCSim package has been widely used for years, and serves as a basis for the WCTE, IWCD and Hyper-K experiments.”~~

4. Chloé Malbrunot (cmalbrunot@triumf.ca)

~~a. Section 2.2.1, page 5 : type 750%~~

~~b. Table 4 : Instead of PIONEER consortium the institution should read TRIUMF in the column before my name —JRM: left as is, because there can only be one line per table, and other consortia listed~~

~~c. Table 4: Type → Retière instead of Retier~~

~~d. Table 3:~~

~~PIONEER 2025 : measurement in LXe (not LXe/LAr) - Pioneer construction is listed in 2024. The 2025 box is describing R&D plans in 4 institutions associated with the milestone (not just PIONEER), some of whom are measuring LAr in 2025.~~

~~e. In the context of PIONEER and nEXO we are interested in many aspects beyond optical segmentation in LXe, including:~~

~~i. • Procurement : in particular for nEXO but also at a smaller scale for PIONEER~~

~~ii. • Target properties (D1 & D2). We are doing optical simulation benchmarking using LoLX and are comparing Optiks and Chroma performance. We are planning on a run at high energies (~70 MeV) for simulation benchmarking in this energy region)~~

Simulations benchmarking box modified to include ii. E.i is a topic within WP3 so not listed in table 3. Given space constraints we aren't able to add detailed milestones for each institute's plans. Milestone description here is a compromise between finding category descriptions that fit multiple institute's plans.

~~f. •p17: Common tools For PIONEER-related R&D we are using two facilities :~~

~~LoLX located at McGill which is a small (2L) cryostat used for PMT/SiPM characterization, optical simulation benchmarking and Cerenkov light identification and the former MEG prototype which will be adapted for PIONEER's needs and contain roughly ~100L of LXe, currently located at PSI. - LoLX added to table 3 (which is referred to here). Didn't add MEG prototype because of next comment (that it requires a collaboration decision).~~

Given space constraints, section on “Common Tools” doesn't list individual facilities, but refers to earlier sections and focus here is on how collaboration will interact with common facilities. While the MEG prototype will be used for R&D specific to PIONEER, in particular optical segmentation studies as well as energy resolution at “high” energies (~70 MeV), LoLX is more versatile and could be considered a facility. LoLX is a collaboration involving several institutes so I cannot take the decision right now of having it included as potential facility of common use within DRD2 but it could be mentioned as an existing facility - now included in table 3.

- g. ~~•P18, section 4: partnership. PIONEER should probably not be listed as industry. PIONEER is an experiment aiming at measuring pion decay branching ratios extremely precisely and plans on using a large LXe calorimeter.~~
5. Comment to Jim from Alexander:
- a. ~~* Page 15, Table 8: PI for University of Mainz here would be Uwe Oberlack. JimD added "Oberlack/Deisting"~~
- b. ~~However, it would be great to add another half sentence around "Mitigation through material selection/treatment and clean manufacture", which mentions also other material induced backgrounds as e.g. field emission in electrodes of dual phase TPCs. Or maybe just add "surface defects" somewhere in the "native surface contamination of" sentences. JimD added the following to this section: "In addition to radiogenic surface backgrounds, other material induced background will be considered e.g. surface defects leading to the field emission in electrodes of dual phase TPCs."~~

Other comments to address:

On page 8 there is mention of XLZD having a light collection efficiency of only 5%. Where does this come from? XLZD is estimated to have more like 10-15% light collection efficiency. (@Marcin and @Justo - task 2.2 conveners, this is a question for you)

Sergey Pereverzev LLNL sent some comments in an email "DRD2 Proposal omments" about importance of addressing delayed electron /photon emission on and wantting to perform at LLNL R&D on reducing charge accumulation on surfaces and interphases. Jim Dobson added based on email to a few of us. I think this is task 1.2.

Also, the following sentence mentions WLS but this is presumably in the context of LAr. Very early tests of WLS are over a decade old and none of the recent (over 10 years) experiments nor XLZD entertain WLS, so I don't think it is appropriate to mention that here because it implies the LXe community may want to do this, or were actively wanting to do this in the past beyond anything but bare bones R&D.