

# CPS Status

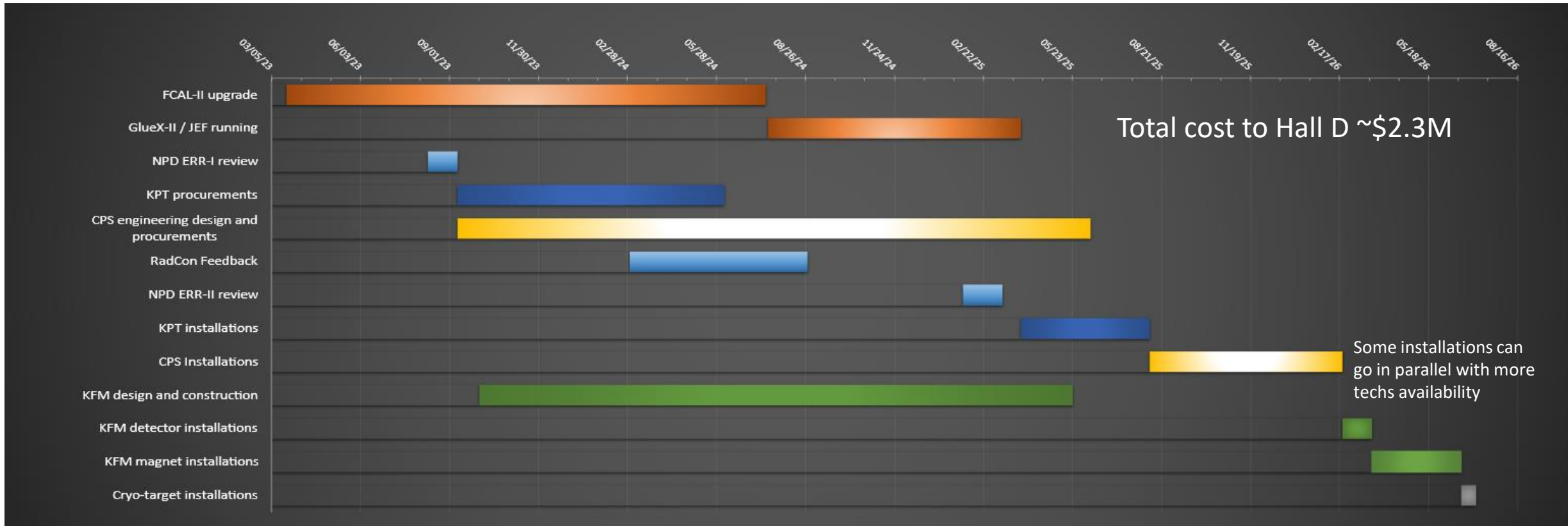
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# Where are we now?

- CPS is the main new component for the KLF experiment.
- We have been meeting for about one year to design Hall D version of CPS.
- We started with considering Hall C design.
- Vitaly proposed a new larger design to avoid overheating of the copper core of CPS and significantly reduce the cost.
  - Temperature and radiation condition in and around CPS have been evaluated.
    - Temperatures have been estimated with ANSYS with fine and coarse mesh.
    - Conditions outside of the halls are estimated as well. No problems seen there.
  - The design is already in an advanced stage.
  - Tim has magnet conceptual design for the “reference design”.
  - Vitaly is working on optimizing the design for the cost and radiation environment.
- Pavel suggested another design in December of 2022.
  - Based on the original ideas for KLF CPS from many years ago
  - This seems to be a promising option as well.
  - Pavel plans to work on his design during next few weeks.
- In addition to being the Hall D contact, I will also be managing the projects parts that are funded from Hall D budget.
  - Includes CPS, KPT, electron and photon beamlines.
  - Decided on KLF meeting on April 4<sup>th</sup>.

- Compact Photon Source (CPS) status
  - Conceptual design is still in progress.
  - Material and fabrication cost estimate: **\$1.5M** with a large uncertainty.
  - Engineering design and procurement: 21 months after ERR-1 approval
    - Requires 1 designer and 0.5 engineers for the duration
  - Installation : 6.5 months
    - Requires 3.5 technicians and 0.2 engineers for the durations
- Accelerator / Beamline instrumentation
  - Beam bunching of 64ns and 128ns are being studied.
  - Compatibility with MOLLER is under investigation.
  - Exact electron beam steering and focusing requirements dependent of CPS design
    - Preliminarily the beam size and rastering requirements are not very different from GlueX.
    - They were presented to Edith Nissen. No major obstacles is seen.
  - Exact beam-related costs to Hall D are not known, assumed **\$0.2M**.

- Collimator cave status
  - Conceptual and engineering designs are complete
  - Material and fabrication cost estimate: **\$0.3M**
  - Procurement: 9 months after ERR-1 approval
  - Installation 4.3 months
    - Requires 3.5 techs and 0.1 engineers for the durations.
- Kaon Flux Monitor (KLF)
  - No conceptual design yet
    - Multiple scenarios are being considered based on the funding approval .
  - Original estimate of \$0.7M should be covered by University of York.
  - Cost to Hall D is not known yet
    - Strongly depends on the conceptual design, assumed **\$0.3M**
- Cryo-target
  - Requires change of the target cell size.
  - Will be fully covered by the Target Group.



# Plans for the Next Few Months

- We need to finalize Vitaly's design.
  - Finish the optimizations and studies.
  - Write a nice document for the reviewers.
- Pavel will work on further developing his design.
  - Need approval of RadCon group management.
  - Develop the final design, including the magnet.
  - Write a document for the review.
- For both models we also need to check the stability of the core temperature of CPS design with respect to:
  - 1) Electron beam width variations (make beam narrower and wider)
  - 2) Electron beam position variations
  - 3) Electron beam direction variations
  - 4) Magnetic field variations on order of a  $\sim 1\%$
  - 5) Change of the thickness of the radiator
- Define the electron beam requirements (steering, focusing, stability) for both CPS models.
- Check the temperature of the radiator at 10% R.L.
  - Assume some kind of water cooling
- Pick the design for the review and pass the review
  - We need to get as few comments and suggestions as possible to make the schedule of July 2026 running.