

# WIMP/Direct Detection Project Planning CDM Annual Workshop

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## Summary of the February 2022 Review of The ARC Centre of Excellence for Dark Matter

The International Science Advisory Committee:

Janet Conrad (Chair), Nigel Smith (Deputy Chair), Thomas Browder,  
Stephen Buckman, Aaron Chou, Priscilla Cushman, Carlos Frenk,  
Daniel Hooper and Ian Shipsey

September 26, 2022

- A strategy for the Centre that includes collaboration-wide decision-making about future projects should be put in place that leads to a program that maximizes the value of the present assets and the future SUPL laboratory.
- Producing competitive and exciting results from SABRE in a timely fashion must be the top priority, and more resources from within Australia and international partners, such as SABRE North, must be quickly mobilized for this goal.
- Once SABRE is installed, an international workshop on developing a non-WIMP SABRE program should be held at a site near the SUPL laboratory to generate further international interest.

- This presentation provides a proposal for a procedure.
- There are many ideas for new projects. For the best chance of success we need to work together.
- We are mostly at the concept stage with future WIMP projects, but must move through the design stages soon.
- Major particle physics projects typically target LE and LP funding.
  - LE24 is due by to the ARC by 29 March 2023.
  - SABRE is submitting an LE request (not successful in LE23 round).

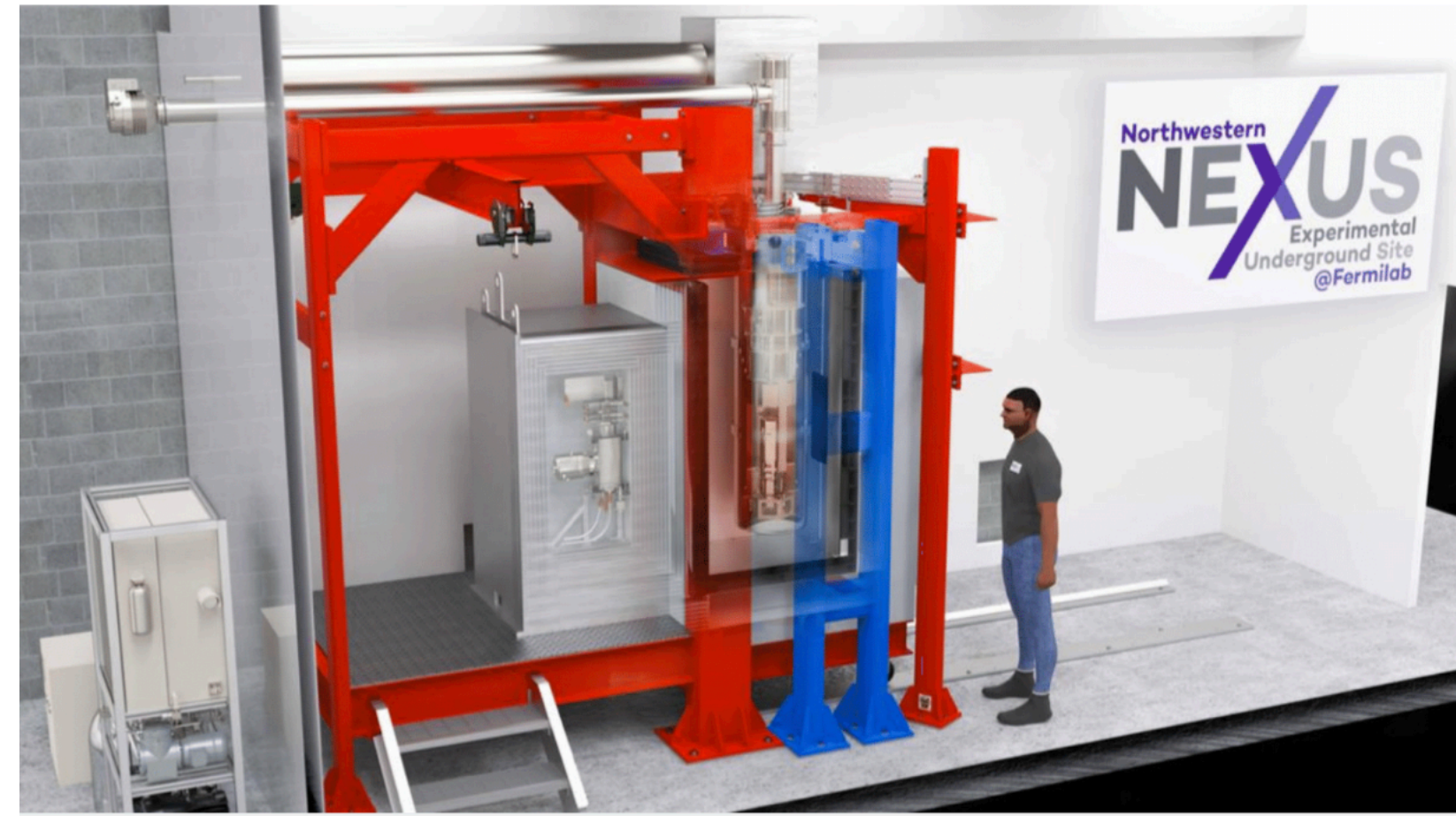
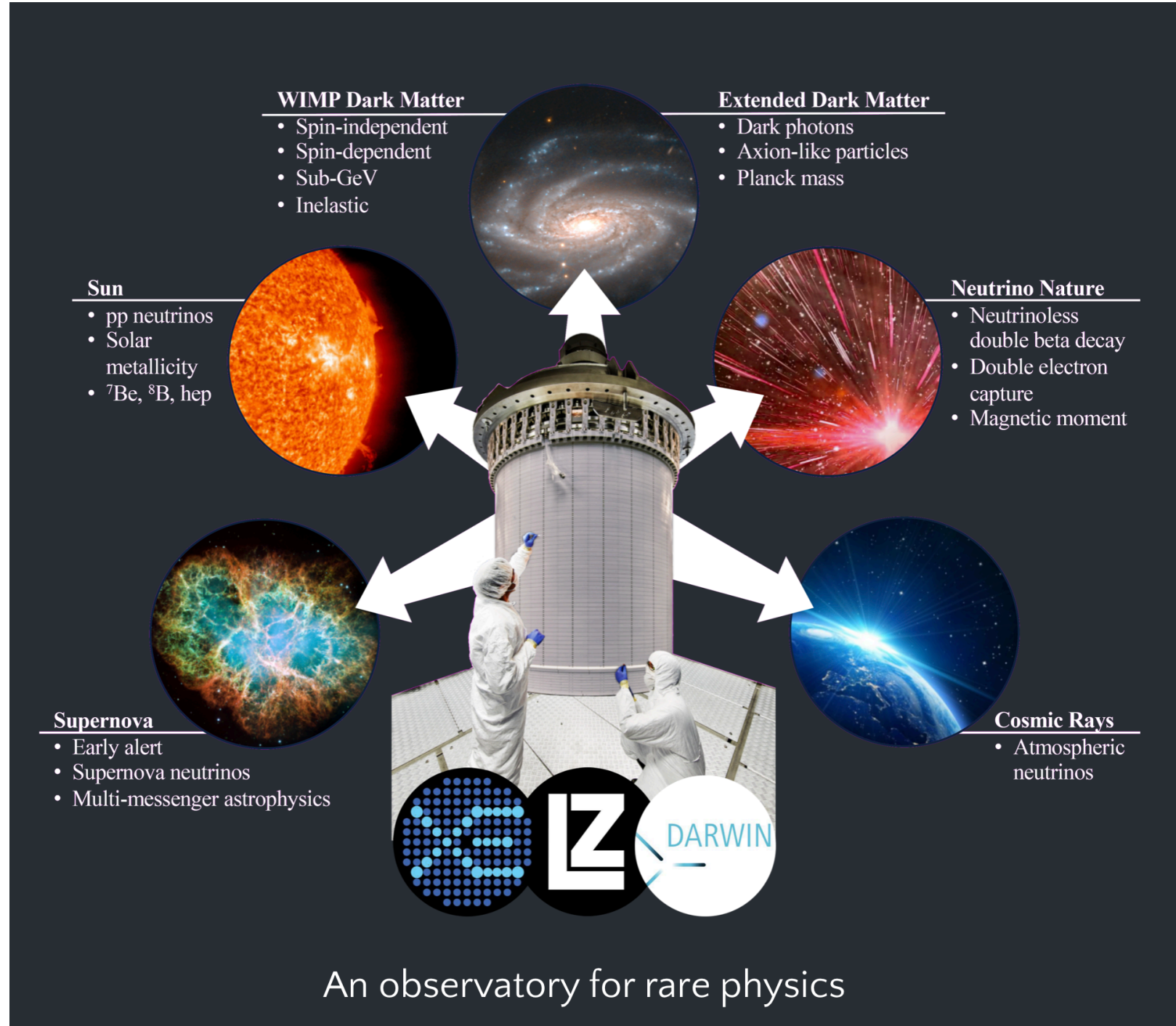
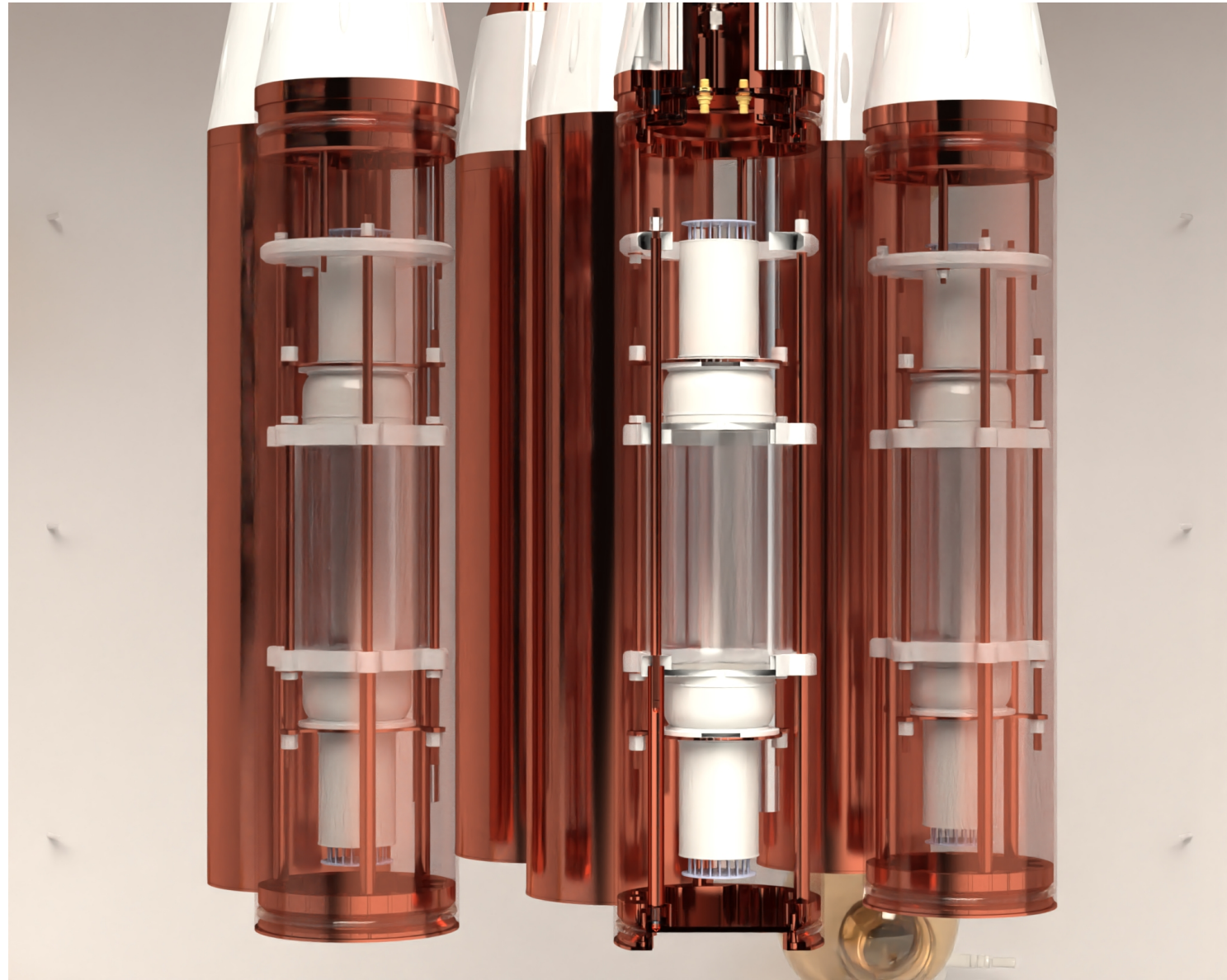
- We propose to establish a procedure to develop new experiment research programs within CDM via stages of liaising, documentation, resource estimation, and review.
- Future projects must take into account available resources and opportunities for further resources. This includes, financial, personnel, and space at SUPL if hosted there.
- Expect that any future programs may be considered in the following categories.
  - **Category 1 Strategic SUPL Experiments**
    - These will be experiments with strategic physics outcomes. Infrastructure costs will be dominated by the requirements of SABRE for the coming year, but long term planning associated to personnel should start already.
  - **Category 2 International Experiments**
    - Key international experiment programs for the CoE to engage in. These will generally be experiments with broad physics outcomes in very large facilities that cannot be undertaken in Australia.
  - **Category 3 R&D Facilities**
    - Synergistic research and development programs with outcomes for future experiments. These will primarily support future experiments in Australia, but can also be used for technology development in larger scale experiments overseas. This category may require infrastructure funding by the end of 2023, placing a stringent requirement that a review process is completed in time for LE (or LP) submission. R&D is a good opportunity for LP.



Cat 1: SABRE

Cat 2: XLZD

Cat 3: Cryogenic test facility





- SUPL has an independent research committee that will review and prioritise any new projects with a process that is independent of the CoE.
- Integrating any new facilities into SUPL is non-trivial.
  - SABRE will be the largest user for ~ 5 years.
  - There is limited space for new facilities.
- This needs to be taken into account in any dialogue and planning processes.





- Grass-roots process to elucidate ideas for new projects that will feed into the the EoI stage.
- Initially based on survey from M. Tobar prior to the CI meeting.
- We can expand on these ideas through discussions at this workshop.





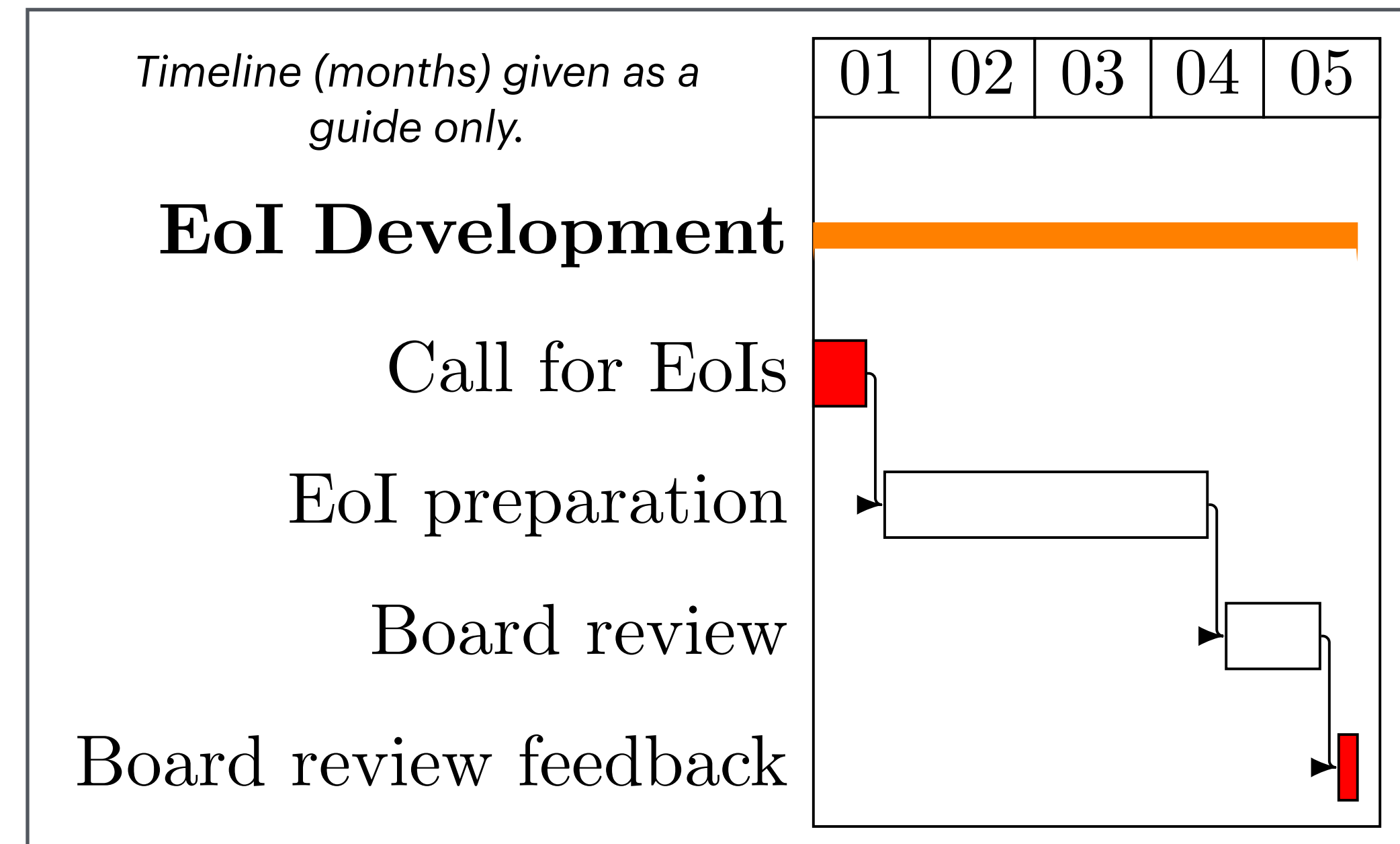
# Stage 1: Expressions of interest

- **Expressions of interest** are short documents (5 pages) containing: a statement of the physics goals; a description of the experiment; maturity of technologies and timescale for implementation; a rough estimate of the budget and FTE requirements, maybe extrapolating from previous projects. The document should not be a large burden on the authors. There should be an opportunity to propose highly innovative, high risk projects, as well as more mature projects. ECRs are welcome to submit Eols for review.

1. Expressions of interest prepared under the three categories of project, which can include future plans for current projects such as SABRE.  
*Responsible: Centre CIs and AIs and their research teams. Should include ECRs.*

1.1. Review of resource requirements and timelines, including how experiments will be built at the required scale and the potential interplay or interference between the different proposed projects.  
*Responsible: Light review by centre research committee.*

2. Feedback to each program by a panel of experts and stakeholders, particularly in identifying feasibility and strategic research.  
*Responsible: A team of experts comprised of PIs, CIs, SUPL representatives, and outside experts determined by the Centre research committee (i.e. ISAC).*



*We encourage Eols to be written for ongoing projects and international projects to clarify future plans (category 2).*



# Stage 2: Conceptual Design Reports

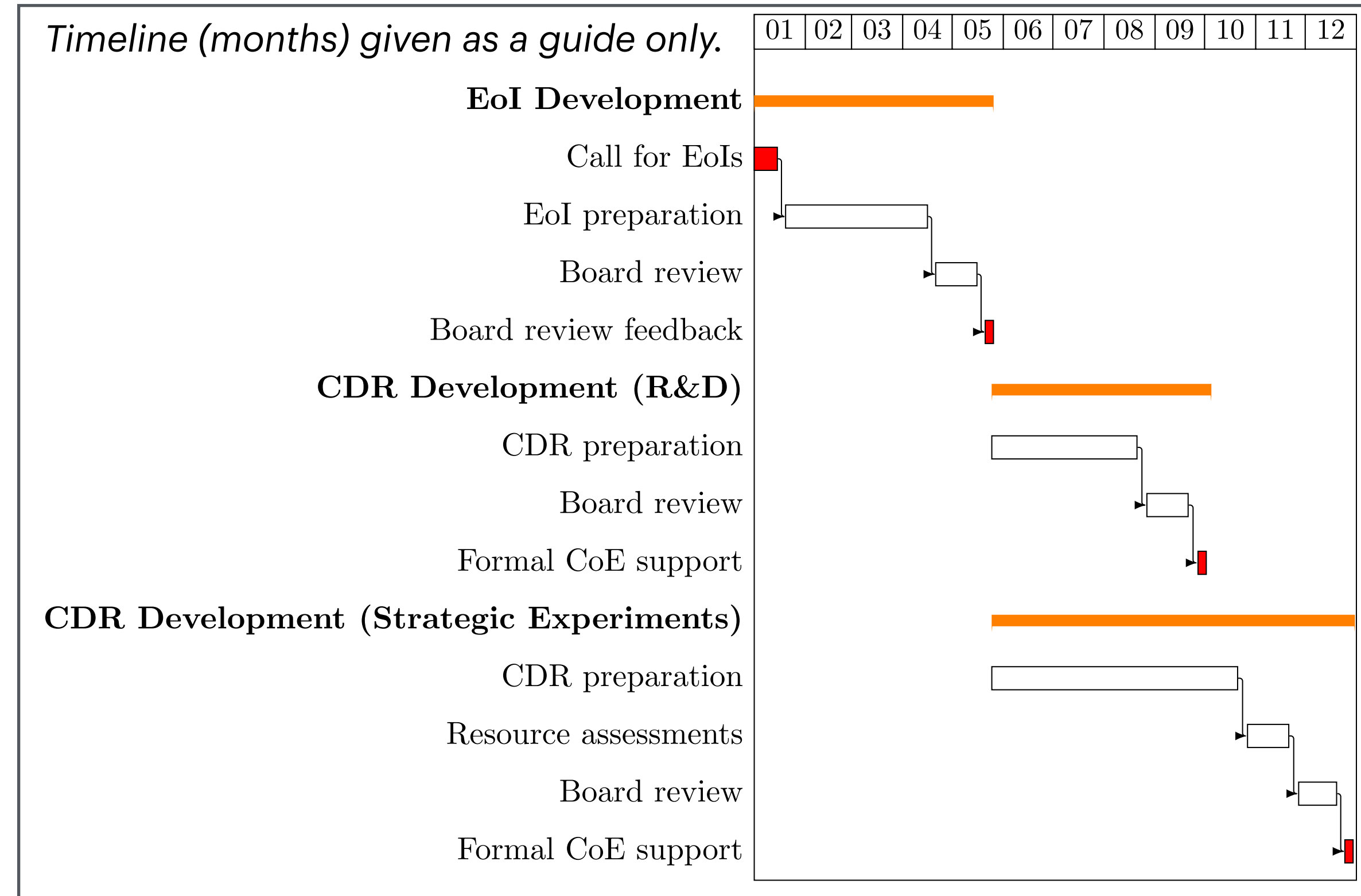
- **Conceptual design reports** are longer documents (20+ pages depending on complexity) with **sufficient detail to produce an accurate budget cost, and a clear description of the physics impact and competitiveness.**

1. Conceptual design report to be prepared for facilities hosted in Australia. (We may need to do this for international projects too if they require substantial competing resources.)  
*Responsible: Centre CIs and AIs and their research teams.*

2. Review of resources for Australian hosted projects.  
*Responsible: Centre WIMP research committee.*

3. Review of each program that proceeds to conceptual design report.  
*Responsible: A team of experts comprised of PIs, CIs, SUPL, and outside experts determined by the Centre research committee (i.e. ISAC). This probably should be the same team that reviewed the Eols.*

4. Formal support to complete and operate the project.  
*Responsible: Centre leadership.*



*CDRs for full scale experiments are expected to require significantly longer timescales than R&D programs. Full scale experiments may need multiple income streams, including evidence of international collaboration on the projects.*



# What's next?

- The WIMP direct detection working group will manage the preparation of EoIs over the coming months.
- The research committee will be engaged to provide feedback on resources in this process.
- EoIs are expected to lead to grant proposals in the coming rounds. Not necessarily all.
- Through this process the centre can maximise the present assets of CDM and the potential for impactful research, particularly involving SUPL.