How to Accelerate Future Innovation in the **Instrumentation** and **Computational** Frontiers (and Everywhere Else) *for the 21st century*

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(DISCLAIMER: fully funded, LZ: Cosmic Frontier. Not complaining. Advocating for others, offering solutions)
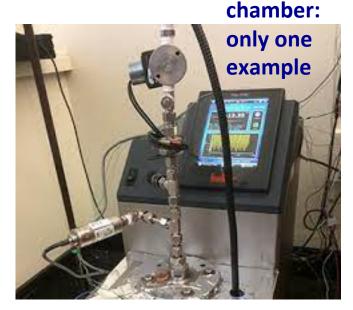
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(not representing LZ, NEST, Snowball, or any other collaboration today. All opinions my own)

Proposal Reviews

- Double-blind review for concepts being proposed by individual PIs and/or by small consortia instead of by large collaborations (which are not always "hypothesis driven")
  - Will help with DEI, not just in terms of non-old-white-males but also smaller institutions
  - Imperfect of course due to arXiv and Google, but it can work: $https://arxiv.org/abs/1807.01408$
- Institution of a rebuttal round (just one)
  - This is especially key when the following happens: "You never addressed X," except that X is in bold on page 4 or in Figure 3. Only counter argument is that extra work. UK already has this
- Continuity: because panels and mail-in reviewers change every year, this can lead to repeated 180-degree changes and changes back
  - Hard to find (same) reviewers in general, too much work
  - Solution: have section "Addressing Past Reviews" (NIH does it)
- Consolation prizes for hard work: e.g. 1 student to try out

Specific to Instrumentation

- Budget: for the DOE R&D program specifically, need clearer guidance
  - Cannot just say "there is very little $," as then when you only ask for a little money you get told by the reviewers "not enough for scope" Too fine a line to walk
  - De-scope -> "not interesting enough"
  - Consortia encouraged, except that costs more $$$ and then you're told too much money or too little for scope
- CPAD etc: Allow for a truly "misc" category for new ideas which don't fit in any pre-determined box
- Allow truly interdisciplinary ideas. At least allow HEP and nuclear $ to merge
  - Increased cooperation: DOE and NSF,…
  - Real high-risk, high OR low-return (not just for early career programs)

"Blue skies, shining on me!"

Final Thoughts on Proposals & Projects

- Community engagement should not be just an afterthought (discussed at length at Snowmass)
  - DOE could become better aligned with NSF in this respect
- Less multiplication of regulations and appendices, which are getting out of hand
  - Proposal is now only ~5% research narrative, the rest of it is required appendices (and budgets)
- Data management plan, new DEI mentorship plan,... => These are important. But, conserve work time
  - To make room for them, drop/reduce the other appendices
- Broader impacts suggestion seems contradictory, but that can be woven into narrative, even 1 paragraph
  - Not just in wider community: more support for tools used by scientific communities (G4, NEST)
- Be less risk averse: e.g. allow DOE projects to fail. Risk aversion also affects smaller schools

Machine Learning Example

- I put in proposals 9-10 years ago myself to do AI/ML for dark matter. Colleagues did too

- Reviewers said (more than 1, and more than once) that that was "silly" and it would "never work" (I have saved the review PDFs)

- Now, DOE has official AI/ML programs and can't get enough of it, and QIS (Note: UAlbany has new AI institute)

- There is something wrong with this picture