

# RF6 “Big ideas” solicited papers

- Organization around science goals/questions.
- Arrange the breadth of RF6 science so that all the main techniques have a chance to shine.
- Span  $\geq 95\%$  of white-paper interests

**1.** Detect dark matter particle production (production reaction or through subsequent DM scattering), with a focus on exploring sensitivity to thermal DM interaction strengths.

Editors: Gordan Krnjaic, Natalia Toro — **Jan. 20**, <https://indico.fnal.gov/event/52857/>

**2.** Explore the structure of the dark sector by producing and detecting unstable dark particles: Minimal Portal Interactions.

Editors: Brian Batell, Chris Hearty — **Jan. 27, today's meeting**

**3.** New Flavors and Rich Structures in Dark Sectors.

Editors: Phil Harris, Philip Schuster, Jure Zupan — **Feb. 3**

**4.** Experiments/facilities/tools

Editors: Phil Ilten, Nhan Tran — **Feb. 10**

More details: <https://docs.google.com/document/d/1R0O23wjGLxRzsc93a4pJIFn17yW9TCTq>

(in our google drive folder, <https://drive.google.com/drive/folders/1sMn1cWl2ddqzu46Yi4TcMIX7Cm2GUxO> )

# Today's focus

1. Detect dark matter particle production (production reaction or through subsequent DM scattering), with a focus on exploring sensitivity to thermal DM interaction strengths.

Editors: Gordan Krnjaic, Natalia Toro

**2. Explore the structure of the dark sector by producing and detecting unstable dark particles: Minimal Portal Interactions.**

Editors: Brian Batell, Chris Hearty, Robert McGehee and Nikita Blinov

3. New Flavors and Rich Structures in Dark Sectors.

Editors: Phil Harris, Philip Schuster, Jure Zupan

4. Experiments/facilities/tools

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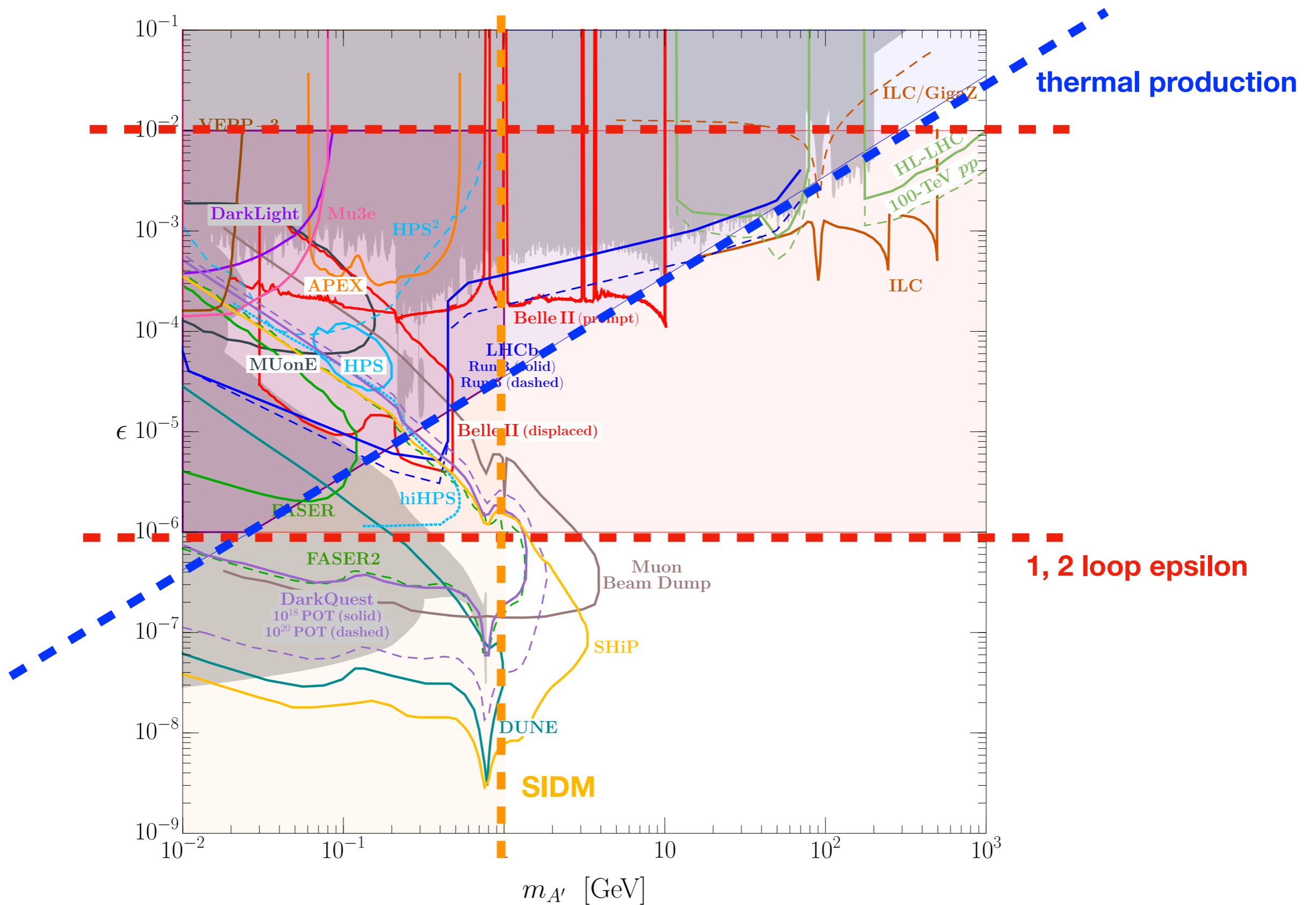
## Big Idea 2 whitepaper structure

- Executive summary - summarize physics motivations, scope of big idea 2, experimental opportunities, connections with big questions, synergies and complementarity with other frontiers and big ideas
- Introduction - recap motivation, opportunities, and whitepaper structure
- Experimental approaches - high-level overview of experimental concepts and search strategies
- Benchmark minimal portal models - Lagrangian, interactions of mediator with SM particles, pheno overview, bounds and projections, connections with big questions
- Dark photon, Higgs portal scalar, HNL (electron and tau mixing dominance), ALP-photon, and ALP-gluon

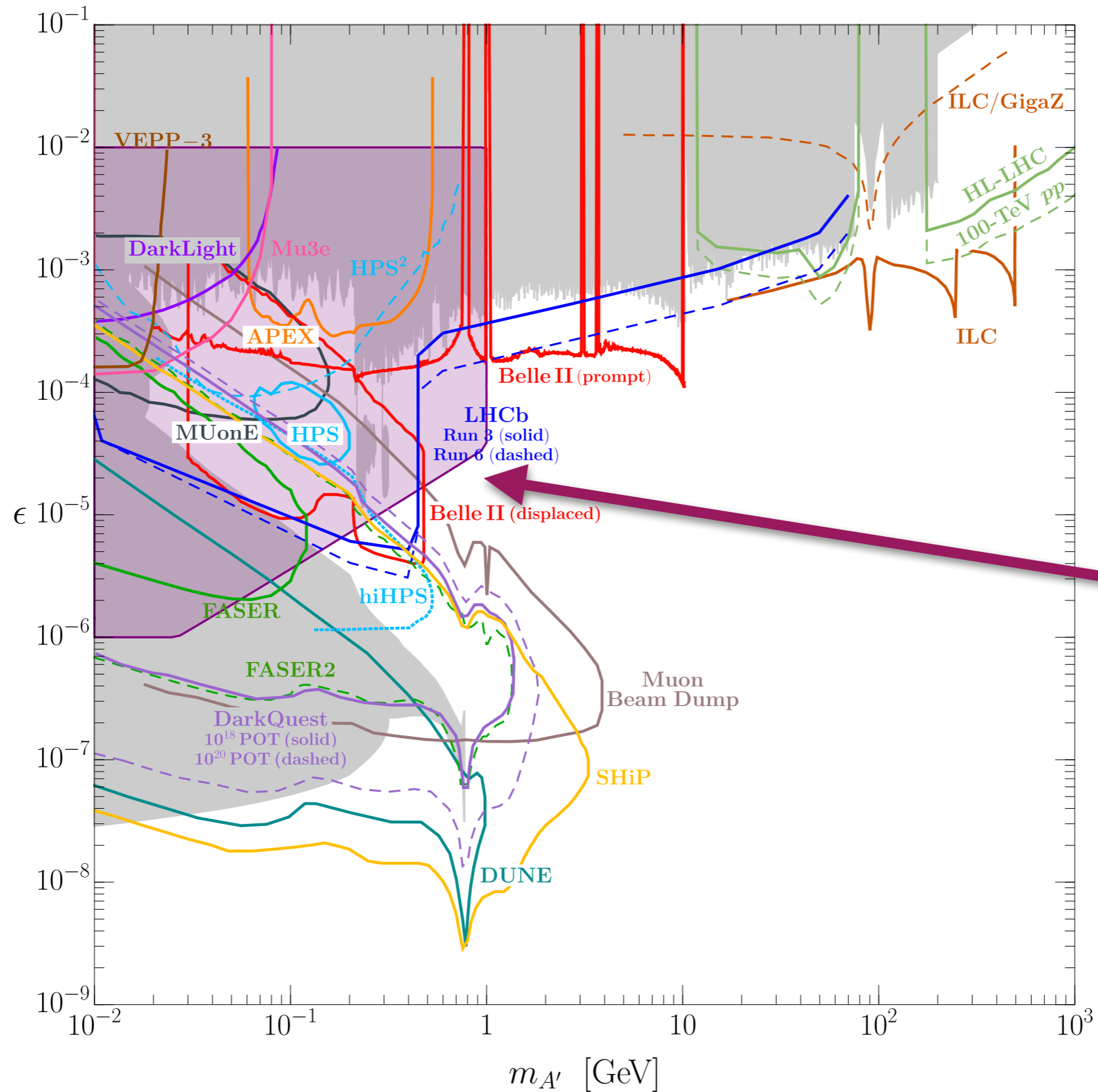
## Status of white paper and to do list:

- Draft of whitepaper posted to Snowmass RF6 slack channel on May 4 and feedback solicited.
- Most of the content is in the whitepaper, but some polishing still needed and a few items remain to be finalized
- Add messaging on scientific opportunities and roadmap to executive summary
- Add dark photon “feature plot” with theory targets to executive summary
- Discuss different levels of sophistication in various projections
- Distinguish time frames for experiments with multiple plots and/or line structure (solid, dashed, dotted)
- Collect additional experimental curves. Please let us know if we are missing any relevant projections.
- Add astrophysical / cosmological bounds to plots

# Dark photon plot with theory targets



# Dark photon plot with theory targets



# Feedback on the whitepaper from the community is welcomed and encouraged!

- If you have comments, suggestions, feedback or would like to sign/endorse the whitepaper, please email us:

[batell@pitt.edu](mailto:batell@pitt.edu)

[hearty@physics.ubc.ca](mailto:hearty@physics.ubc.ca)