RF6 Workshops & Meetings

- We held a joint RF6-EF9,10-AF5 workshop on July 15-16. This was a 2-day event with about 3 hours per day. Discussion focused on the scope of efforts and where there is overlap between the different topics.

- Last week we held an RF6 kickoff meeting on August 12-13. Each day was over 5 hours in length. We had overview talks on all aspects of RF6, and a lot of discussion on benchmarks (next slide), and other issues related to Dark Sectors @ Snowmass, e.g., there is a strong desire to develop a larger and more diverse set of “targets” to motivate our searches.

- We solicited some feedback on what topics would benefit from dedicated meetings. This will be discussed at our weekly RF6 conveners meeting on Monday. Ideas include a dedicated AF5 meeting to discuss future accelerators for dark sectors.

- CPM: The most pressing thing is finalizing the list of benchmark signatures to study (next slide). These take time, so if we want more than what groups have already produced, we need to decide that soon. Less pressing, though perhaps more important, is how we’re going to present these studies. We can recast them into other models if we want. Discussing targets is likely going to proceed for quite some time during the Snowmass process, though this is OK since it should just affect how we present our final plots and our final message. (This all needs to be done together with EF9-10.)

- LOIs: Codex-b, MEGII-fwd, massless A’ (theory). Uncertain how many LOIs expected, we’ve been in contact with ~30 experiments, and have active participation in meetings from many (not sure though who all plans for LOIs).

Benchmarks to Study

We envision organizing benchmarks in a 3-D space of physics interest, portal type, and experimental signature (not shown below, this will be scattering, decay, invisible).

Benchmarks in Final State x Portal Organization

	DM Production	Mediator Decay Via Portal	Structure of Dark Sector
Vector	*m_χ vs. y [$m_{A'}/m_\chi$=3,α_D=.5]* **$m_{A'}$ vs. y** [α_D=0.5, 3 m_χ values] m_χ vs.α_D [$m_{A'}/m_\chi$=3, y=y_{fo}] m_χ vs. m_A [α_D=0.5, y=y_{fo}] *Millicharge m vs. q*	$m_{A'}$ vs. ϵ [decay-mode agnostic] ***$m_{A'}$ vs. ϵ [decays]***	**iDM m_χ vs. y [$m_{A'}/m_\chi$=3,α_D=.5] (anom connection)** **SIMP-motivated cascades [slices TBD]** $U(1)_{B-L\ /\ \mu-\tau\ /\ B-3\tau}$ (DM or SM decays)
Scalar	m_χ vs. sinθ [λ=0, fix m_S/m_χ, g_D] (thermal target excluded 1512.04119, should still include) Note secluded DM relevance of S→SM of mediator searches	*m_S vs. sinθ* [λ=0] *m_S vs. sinθ* [λ=s.t. Br(H→ϕϕ ~10^{-2})]?	Dark Higgs-sstrahlung (w/vector) scalar SIMP models? Leptophilic/leptophobic dark Higgs?
Neutrino	e/μ/τ a la1709.07001?	*m_N vs. U_e* *m_N vs. U_μ* *m_N vs. U_τ* Think more about reasoanble flavor structures	Sterile neutrinos with new forces?
ALP	m_χ vs. fq/l [λ=0, fix m_a/m_χ, g_D] (thermal target excluded) What about f_γ, f_G?	*m_a vs. f_γ* *m_a vs. f_G* *m_a vs. f_q=f_l* (separate?) Think more about reasoanble coupling relations including $f_{W/Z}$	FV axion couplings

\+ Neutron portal (See e.g. 2003.02270)? Hidden valleys (or are these out-of-scope?)?

Bold = BRN benchmark, *italic=PBC benchmark.* others are new suggestions. Underline=CV benchmarks that were not used in BRN

Most benchmarks are recycled from PBC and BRN. Aim to finalize signatures by the CPM to give people enough time to produce results.