

Visible Dark Photons

- Minimal Model:

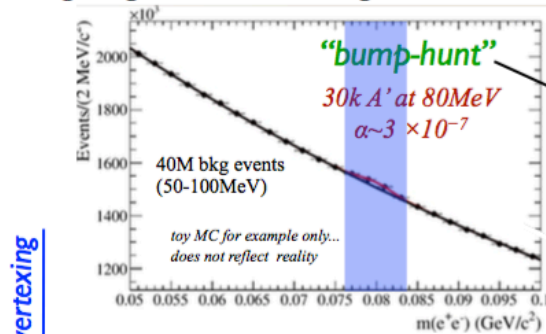
$$\mathcal{L} \supset \frac{\epsilon}{2\cos\theta_W} B_{\mu\nu} A_D^{\mu\nu}$$

- Two parameters: ϵ, M_D
- Regions of interest in our working group:
 $\text{MeV} < M_D < 10 \text{ GeV}$ ϵ as small as you can
- 18 talks, >15 experiments
- Significant overlap w/DMA (2 joint sessions)

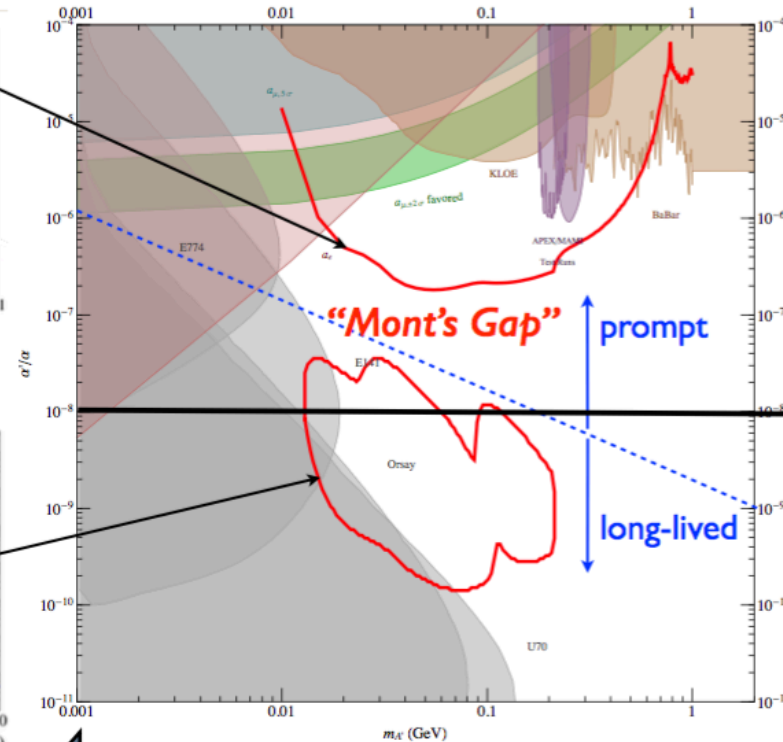
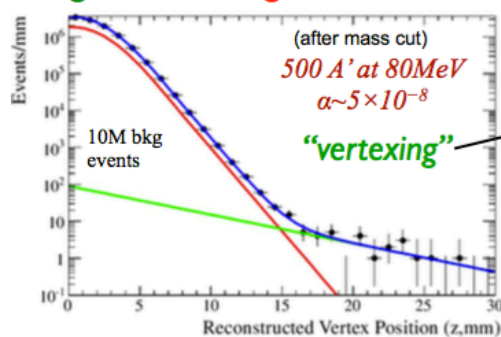
Lay of the Land (a.k.a. Targets)

HPS Signal Sensitivity

Large signal, *HUGE* background



Small **signal**, **NO** background



1-loop
Land

2-loop
(GUT)
Land

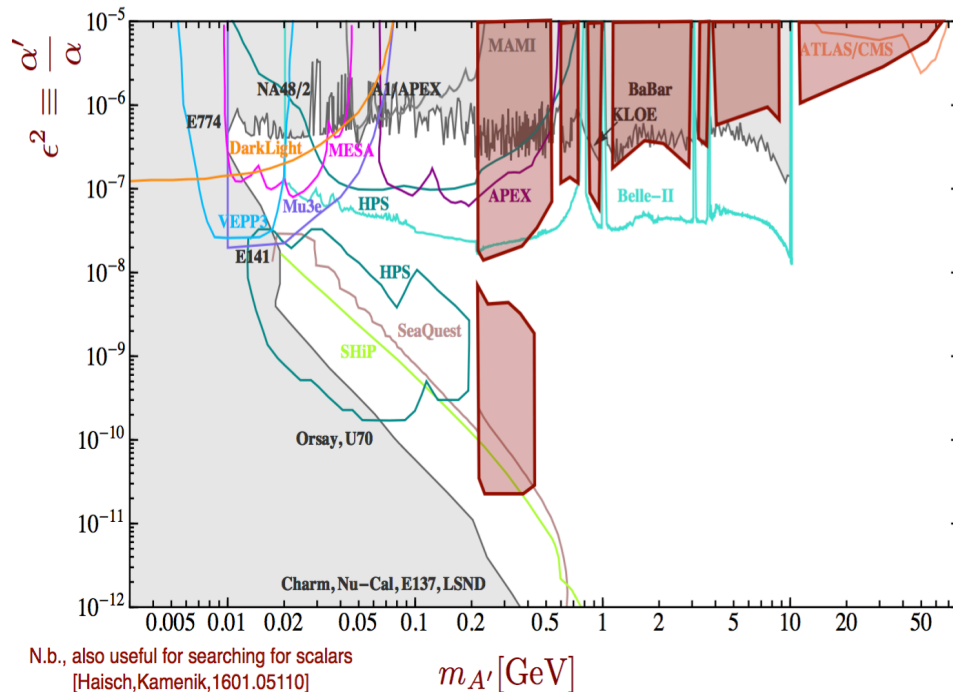
Z' Land

Axion-like-Land

GAPS?

Dark Photons

Move to a triggerless detector readout in Run 3 will have a huge impact on low-mass BSM searches, including dark photons.



Comments:

- Time scale: ~ next 10 years. (not more precise!)
- Multiple approaches -> robust, full coverage?

Upper left zone:

- Ruled out by many kinds of experiments

Middle left zone:

- bump hunting drives down from above
 - systematics
- Vertexing improvements drive up from below
 - Resolution, boost
- HPS upgrades? VEPP3, PADME, MMAPS?
- Belle-II, LHCb (e+e-)
- Moving right: New expts? New ideas?

Lower Left zone:

- High rates
 - Hadronic production (SHIP, SQ, NA64)
- Long decay lengths
- Low background: comprehensive bkg control

Upper Right Zone:

- Collider expts – sqrt(s)

Great Desert:

- What to do here?

Beyond Minimal Model

- This experimental program is sensitive to other types of new physics, and it is important to understand this sensitivity
- Motivated example is gauge bosons coupled to B, L, or B-L
- Expt's require couplings to leptons, quarks, or both; will have different sensitivity in such models
- Need to develop systematic understanding of this sensitivity



don't forget to
cancel
anomalies!

Thanks Mom!