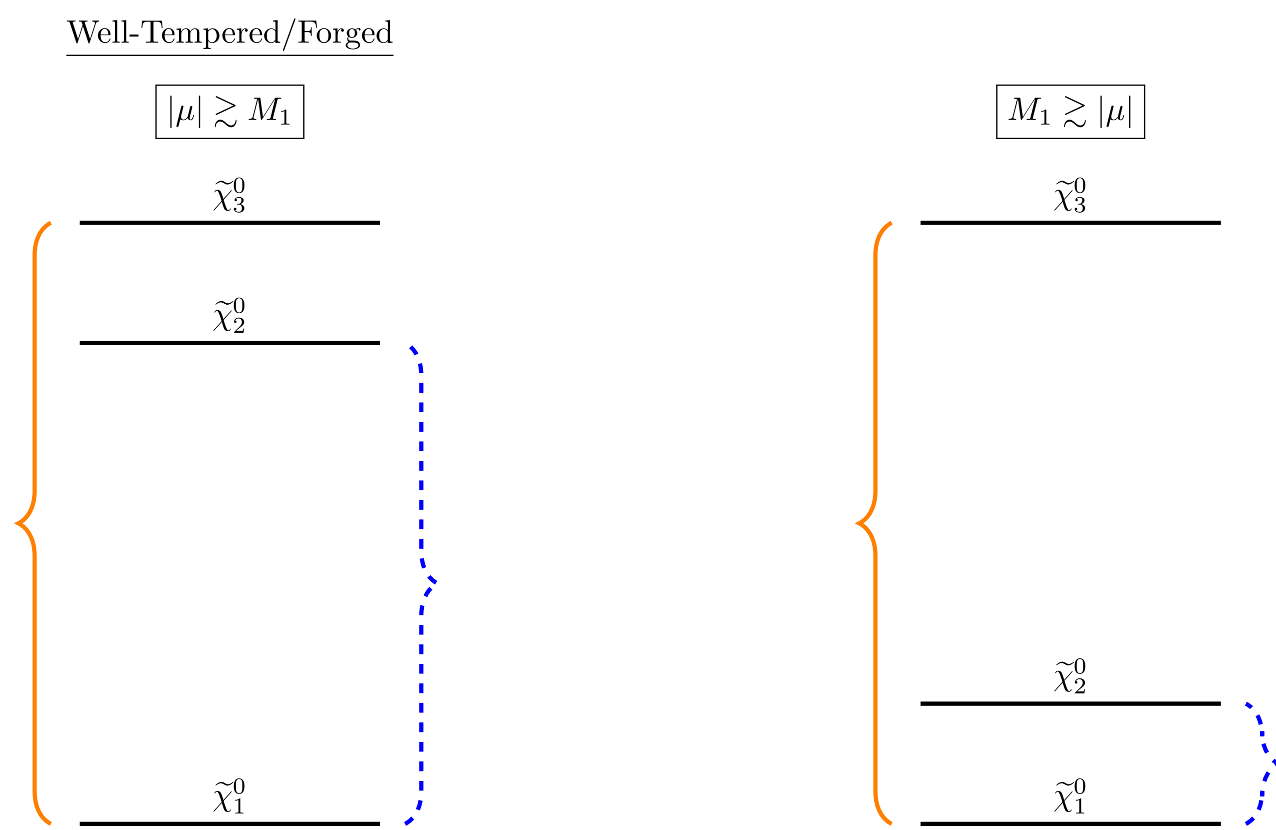
Photon signals for compressed spectra

- Standard trilepton searches for electrowikinos can be problematic for compressed spectra. These scenarios are motivated by DM.

splittings of ~40 GeV



- An alternative signal can be:

$$pp \to \chi_2\chi_3 \to \gamma\ell^+\ell^- + MET$$

Benchmark points	Point A	Point B	Point C	Point D
μ	-150 GeV	-180 GeV	-145 GeV	150 GeV
M_1	125 GeV	160 GeV	120 GeV	125 GeV
$\tan\beta$	2	2	10	10
$m_{\tilde{\chi}_1^0}$	124.0 GeV	157 GeV	105 GeV	103 GeV
$m_{\tilde{\chi}_2^0}$	156.9 GeV	186 GeV	150 GeV	153 GeV
$m_{\tilde{\chi}_3^0}$	157.4 GeV	188 GeV	163 GeV	173 GeV
$\sigma(pp \to \tilde{\chi}_2^0\tilde{\chi}_3^0)$	394 fb	200 fb	345 fb	287 fb
$BR(\tilde{\chi}_2^0 \to \tilde{\chi}_1^0\gamma)$	0.0441	0.0028	0.0017	0.0014
$BR(\tilde{\chi}_2^0 \to \tilde{\chi}_1^0\ell^+\ell^-)$	0.0671	0.0712	0.0702	0.0700
$BR(\tilde{\chi}_3^0 \to \tilde{\chi}_1^0\gamma)$	0.0024	0.0767	0.0115	0.0102
$BR(\tilde{\chi}_3^0 \to \tilde{\chi}_1^0\ell^+\ell^-)$	0.0714	0.0613	0.0447	0.0304
$\sigma(pp \to \tilde{\chi}_2^0\tilde{\chi}_3^0 \to \gamma\ell^+\ell^-\tilde{\chi}_1^0\tilde{\chi}_1^0)$	1.297 fb	1.125 fb	0.279 fb	0.205 fb

'small mass splitting' cuts	Cross section [ab]					Significance
Cut	Signal A	Signal B	$VV\gamma$	$t\bar{t}\gamma$	$Z/\tau\tau\gamma$	S/B
0) Basic Selection	281	169	5830	18900	24500	5.7×10^{-3} (3.4×10^{-3})
1) $N_{jets} = 0$	181	108	4820	1220	21400	6.6×10^{-3} (3.9×10^{-3})
2) $\lvert\Delta\phi_{\ell_1,\ell_2}\rvert < 1.0$	118	79.5	580	201	567	8.8×10^{-2} (5.9×10^{-2})
3) $\left.\begin{array}{c}15 \text{ GeV} < m_T(\ell_2) < 50 \text{ GeV} \\ m_T(\ell_1) < 60 \text{ GeV}\end{array}\right\}$	52.4	38.2	93.3	32.8	92.2	0.24 (0.17)
4) $\lvert\Delta\phi_{\ell\ell-\gamma}\rvert > 1.45$	49.9	37.0	65.2	25.0	67.8	0.32 (0.23)
5) 30 GeV $< p_{T,\gamma} <$ 100 GeV	36.9	28.2	36.6	17.2	19.0	0.51 (0.39)
6) $\not{E}_T$ cuts	26.8	20.2	24.6	3.90	0.00	0.94 (0.71)
7) $m_{\ell\ell} <$ 24 GeV	23.3	19.3	9.29	0.00	0.00	2.5 (2.1)