

# WIMP Search in the Mono-Photon Channel

Moritz Habermehl

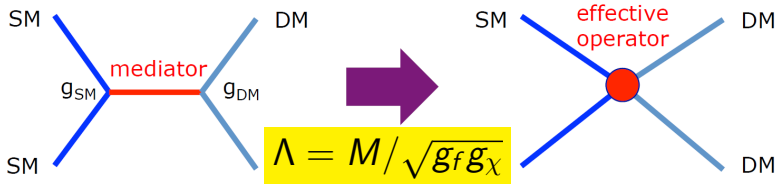
ILD Software / Analysis Meeting

27 July 2016



# Effective Operators

- assumption:  
new physics interaction is mediated by a **heavy** particle
- interaction can be integrated out



$$\left( \frac{g_f g_\chi}{q^2 - M^2} \right) (\bar{f} \gamma_\mu f) (\bar{\chi} \gamma^\mu \chi)$$

$$\frac{1}{\Lambda^2} (\bar{f} \gamma_\mu f) (\bar{\chi} \gamma^\mu \chi)$$

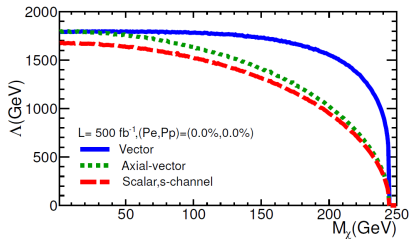
# Event Selection

- signal definition:  $10 \text{ GeV} < E_\gamma < 220 \text{ GeV}$ ,  $|\cos \theta_\gamma| < 0.98$
- transverse momentum:  $p_T > 3 \text{ GeV}$  rejected
- empty detector: visible energy of  $>10 \text{ GeV}$  rejected
- BeamCal cluster  $\rightarrow$  rejected

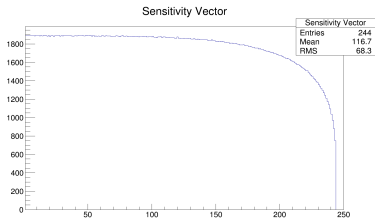
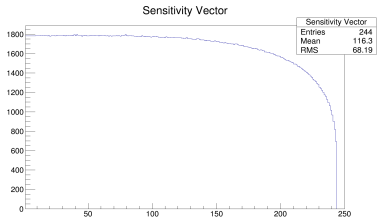
- cut flow
- 14.5 times better suppression

$\nu\nu\gamma$	new sample	old analysis
$p_T$	99.3%	97.7%
$E_{vis}$	91.7%	91.6%
BeamCal	90.8%	89.8%
$e^+e^-\gamma$	new sample	old analysis
$p_T$	26.1%	21.1%
$E_{vis}$	1.9%	16.0%
<b>BeamCal</b>	<b>0.02%</b>	<b>0.29%</b>

# Update: Better Limits due to Lower Bhabha Background I

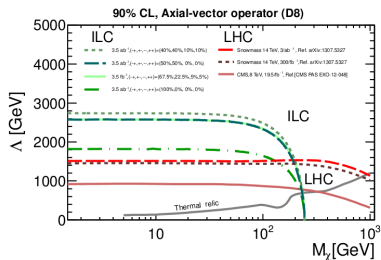


- $500 \text{ fb}^{-1}$
- $\sqrt{s} = 500 \text{ GeV}$
- unpolarised beams



# Update: Better Limits due to Lower Bhabha Background II

- Running scenario H20
- $\sqrt{s} = 500$  GeV
- main contribution to sensitivity:  
right-handed electrons,  
left-handed positrons  
→  $1600 \text{ fb}^1$   
(only this for now)



- no mass scan yet
- $\Lambda$  for 1 GeV WIMP: ... GeV

# Outlook (from last week): Estimate of WIMP Sensitivity

- improvement due to better Bhabha reconstruction
- plot shows estimate
- I'm producing new limits for ICHEP ...

