# Bosonic Super-WIMPs

# In XENON100

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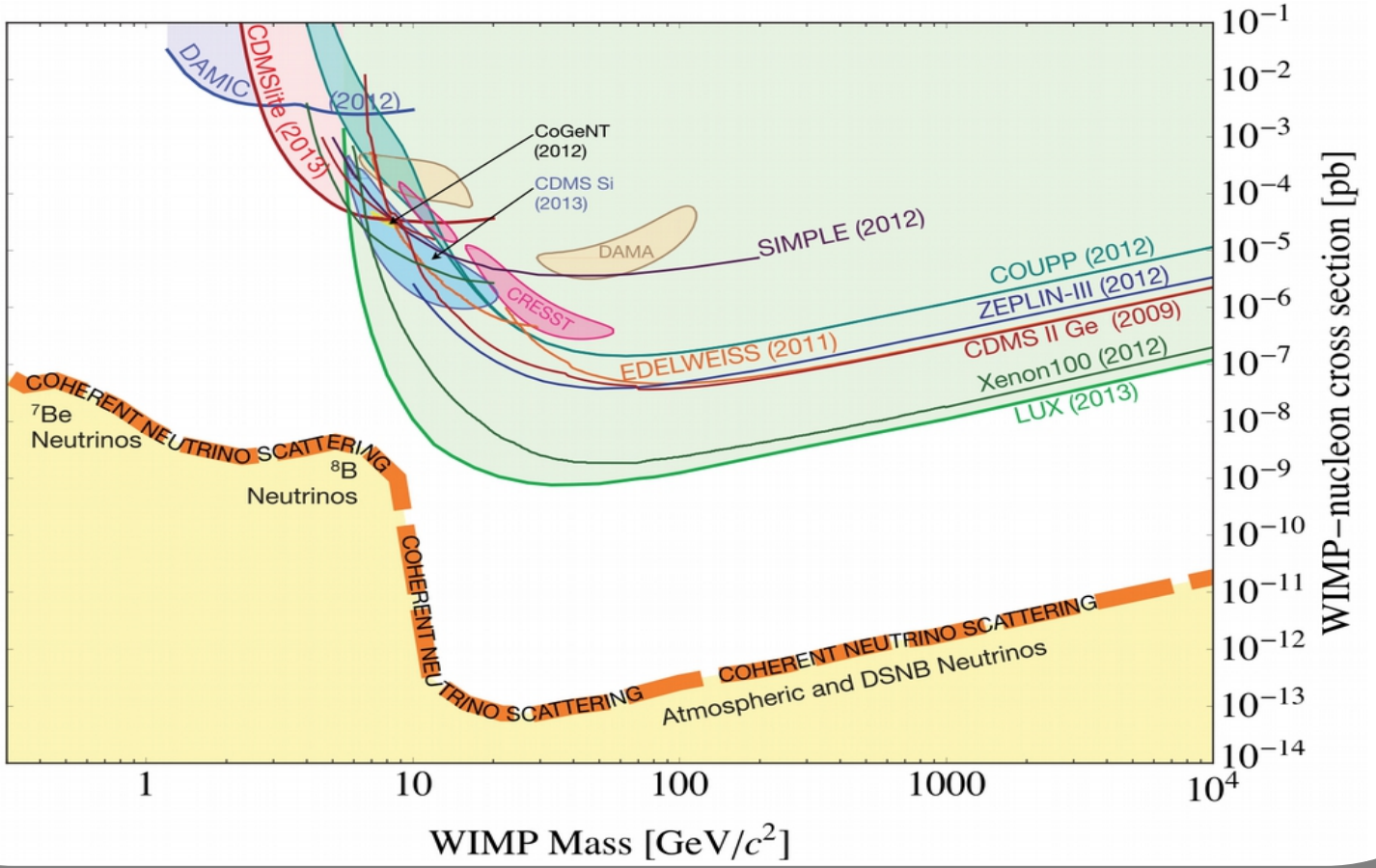
# Status for WIMPs

- Several claimed observations, none have been confirmed as dark matter.
- New experiments such as LUX and XENON1T to probe new parameter space for WIMPs
- Becomes important to use the current generation of dark matter detectors to look for alternative dark matter models.

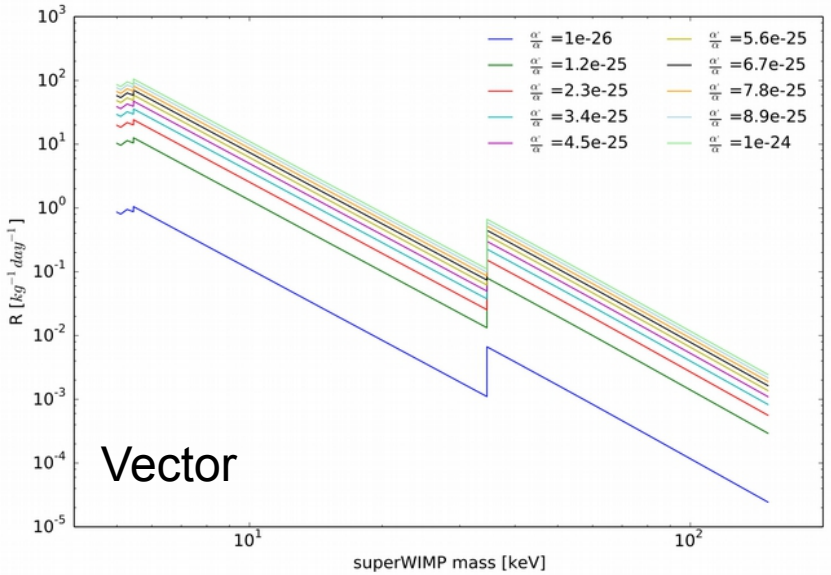


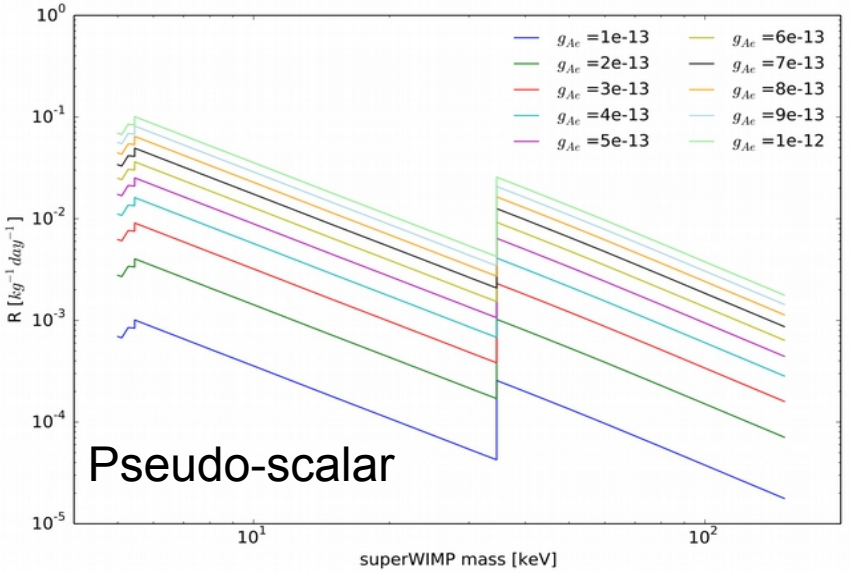
# Bosonic Super-WIMPs

- Absorbed completely into a xenon atom via the axio-electric effect .
- Enables XENON100 to detect a new type of dark matter in the keV scale.
- Vector and Pseudo-scalar super-WIMP models are probed.

$$R = \frac{4 \times 10^{23}}{A} \frac{\alpha'}{\alpha} \frac{1}{m_A} \sigma_{pe} [\frac{1}{kg} \frac{1}{day}]$$

$$R = \frac{1.29 \times 10^{19}}{A} g_{Ae}^2 m_A \sigma_{pe} [\frac{1}{kg} \frac{1}{day}]$$

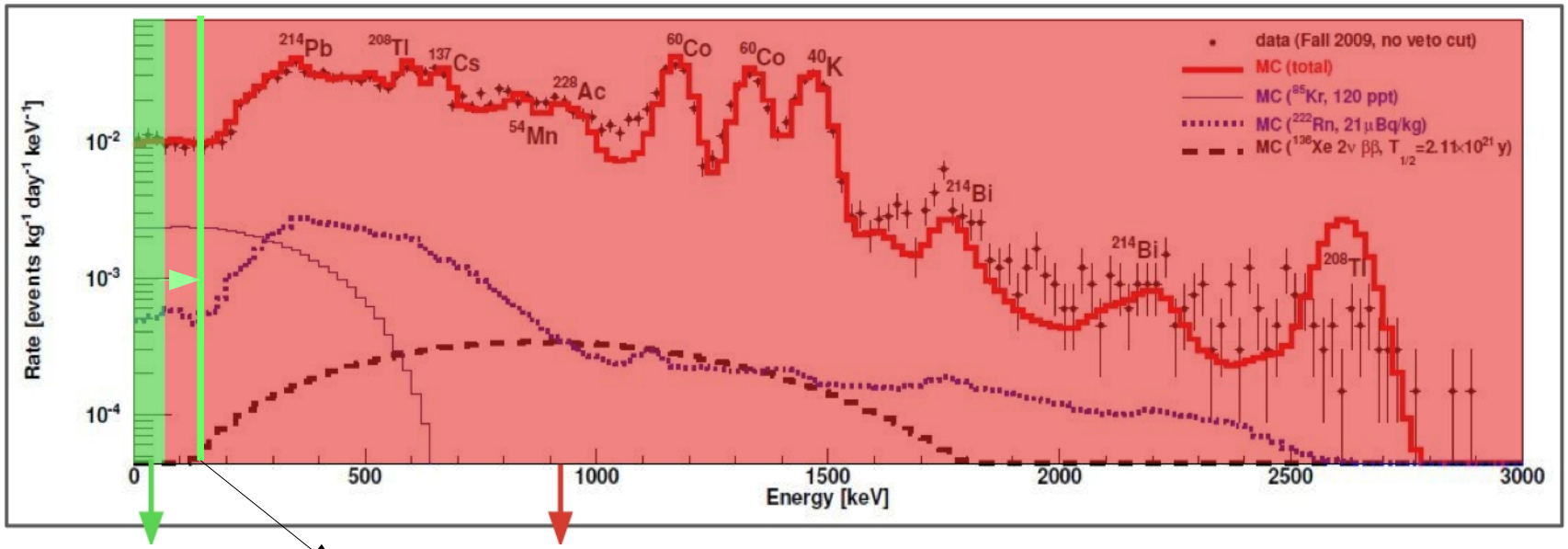



Pospelov et. al. Phys. Rev. D 78, 115012

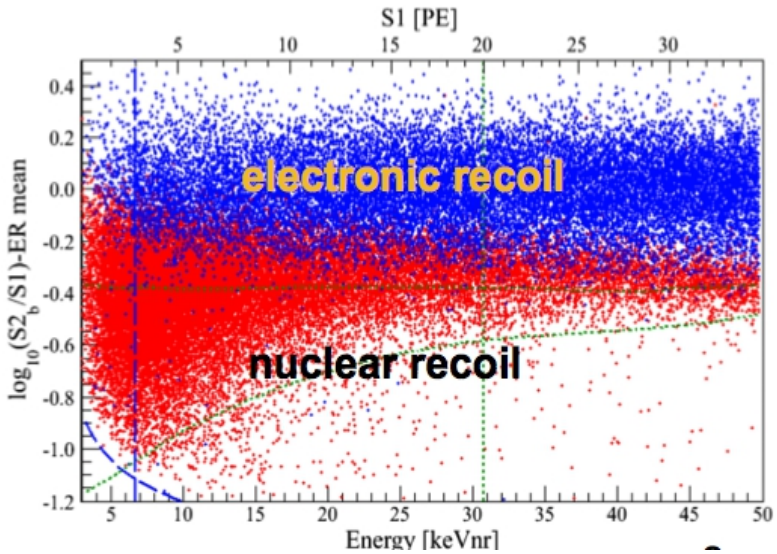
# Detection in XENON100

Background spectrum from XENON100



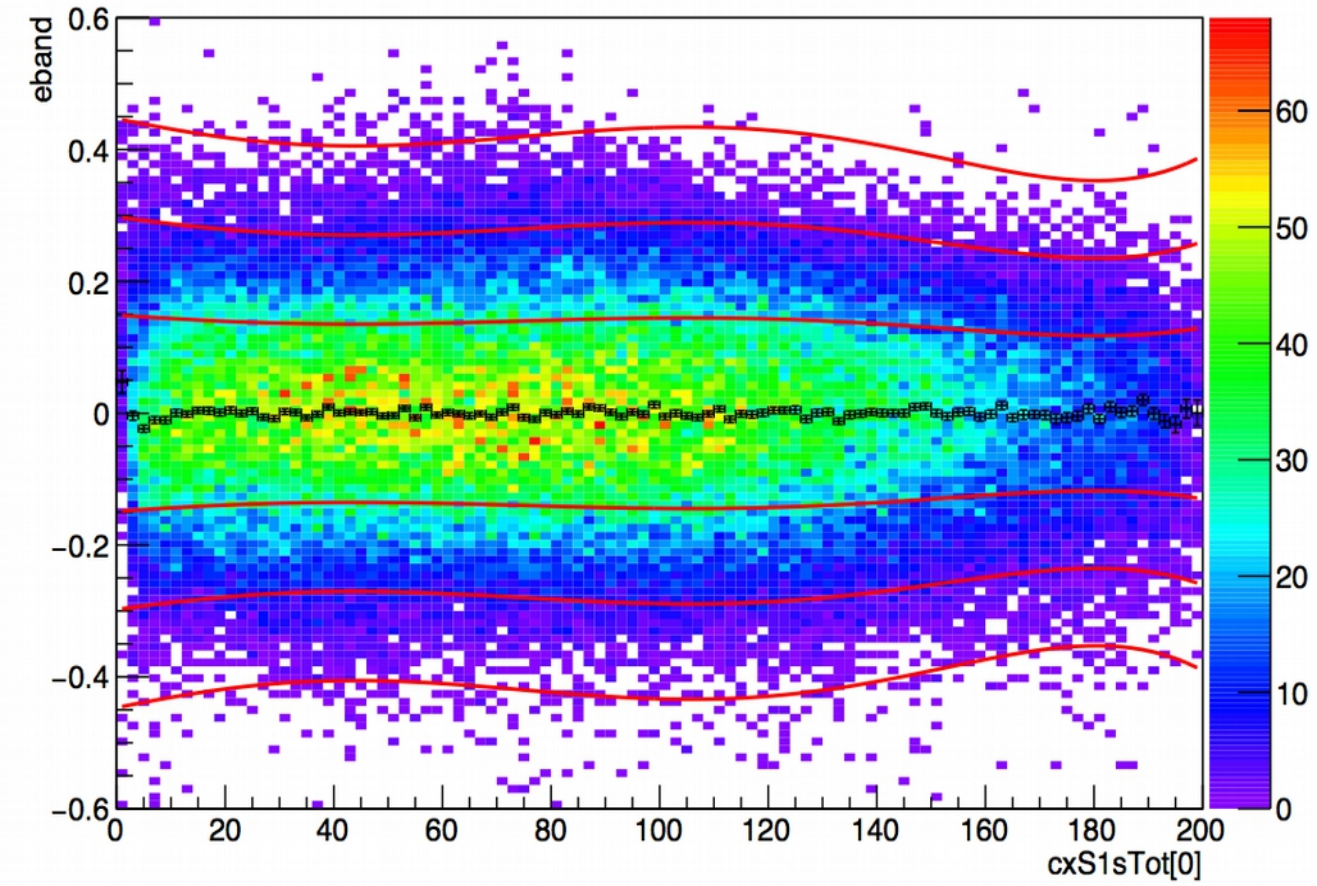

| WIMP search energy range | Bosonic Super-WIMP search | Out of RoI |
|---|---|---|

- Bosonic superWIMPs can be found in range up to ~150 keV in XENON100.
- Higher Energies more difficult due to higher background.



# Selecting Events

- Must look in electronic recoil band for excess of events over BG
- Expected signal will be a delta function spread due to the energy resolution of the detector (2.5% at 1 MeV for XENON100).
- Preliminary limit can be set by counting events in energy range.



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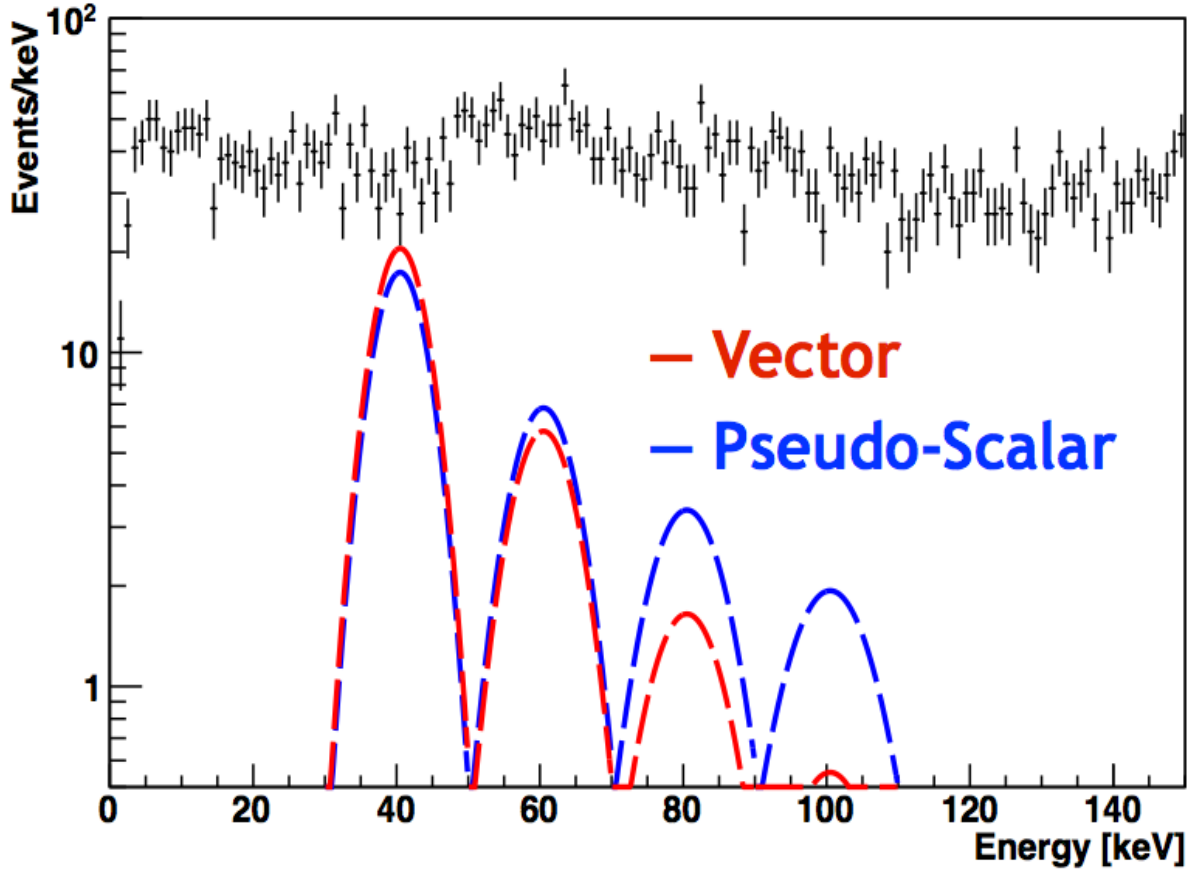
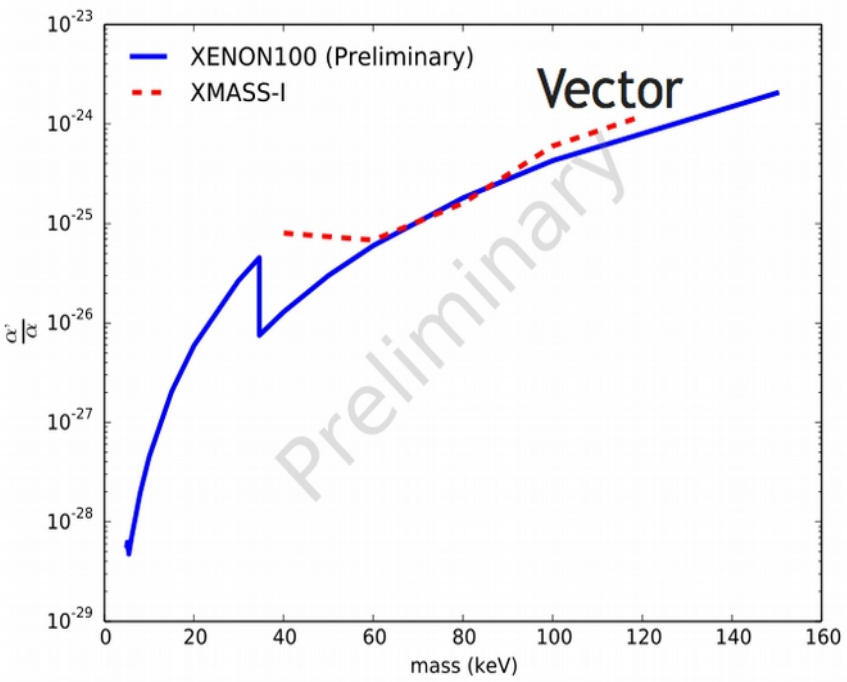
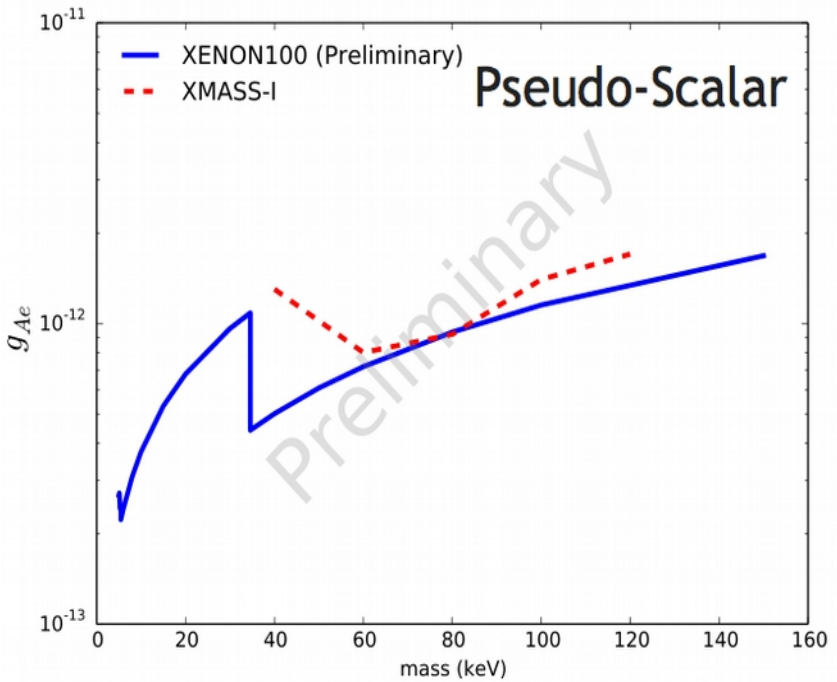


# Setting a Limit

- Will be able to improve our sensitivity via PL analysis and data from the most recent run.
- Potential to improve sensitivity by factor of 4 at low energies, and probe higher energies not attainable by XMASS.
- Preliminary results may be improved via optimisation of the electronic recoil band definition.




XMASS Limit: Phys. Rev. Lett. 113, 121301

Thank You!