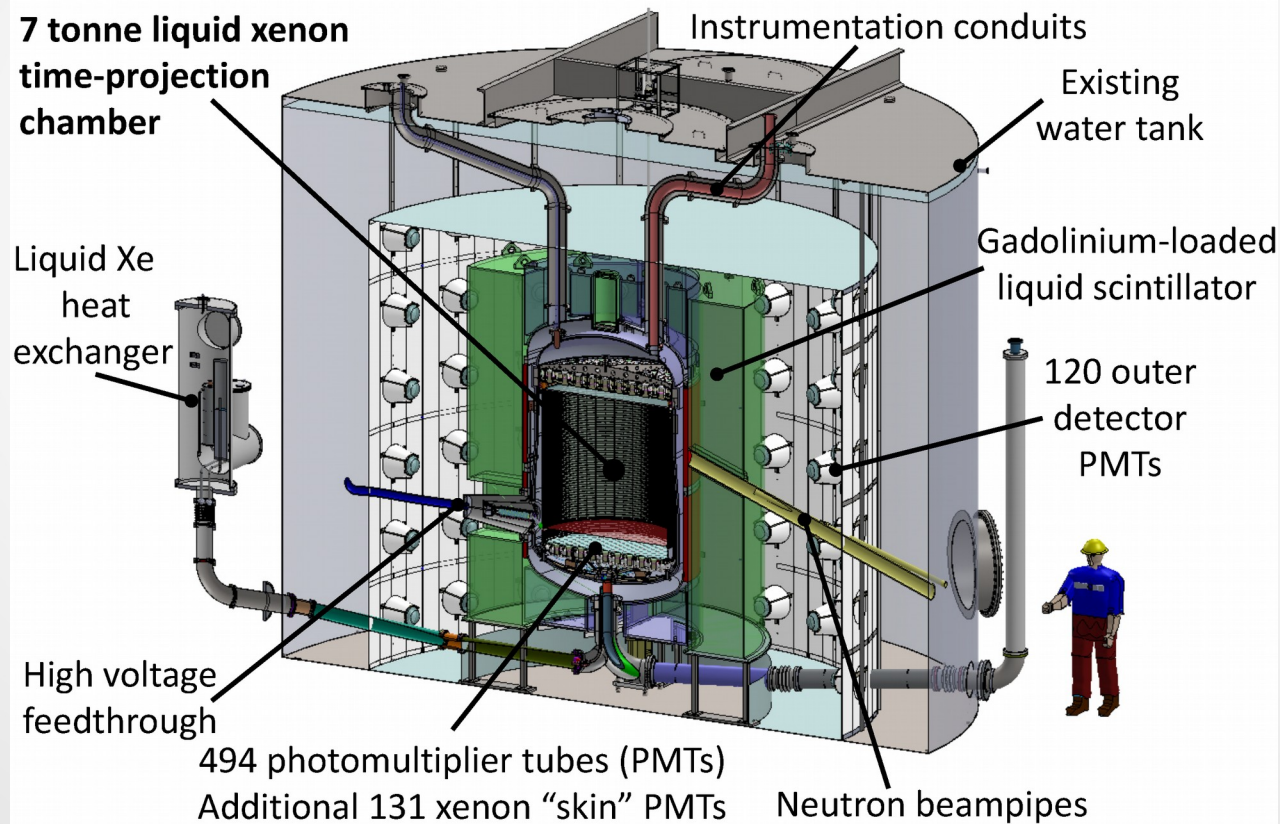


WIMP Nuclear Recoil Spectra

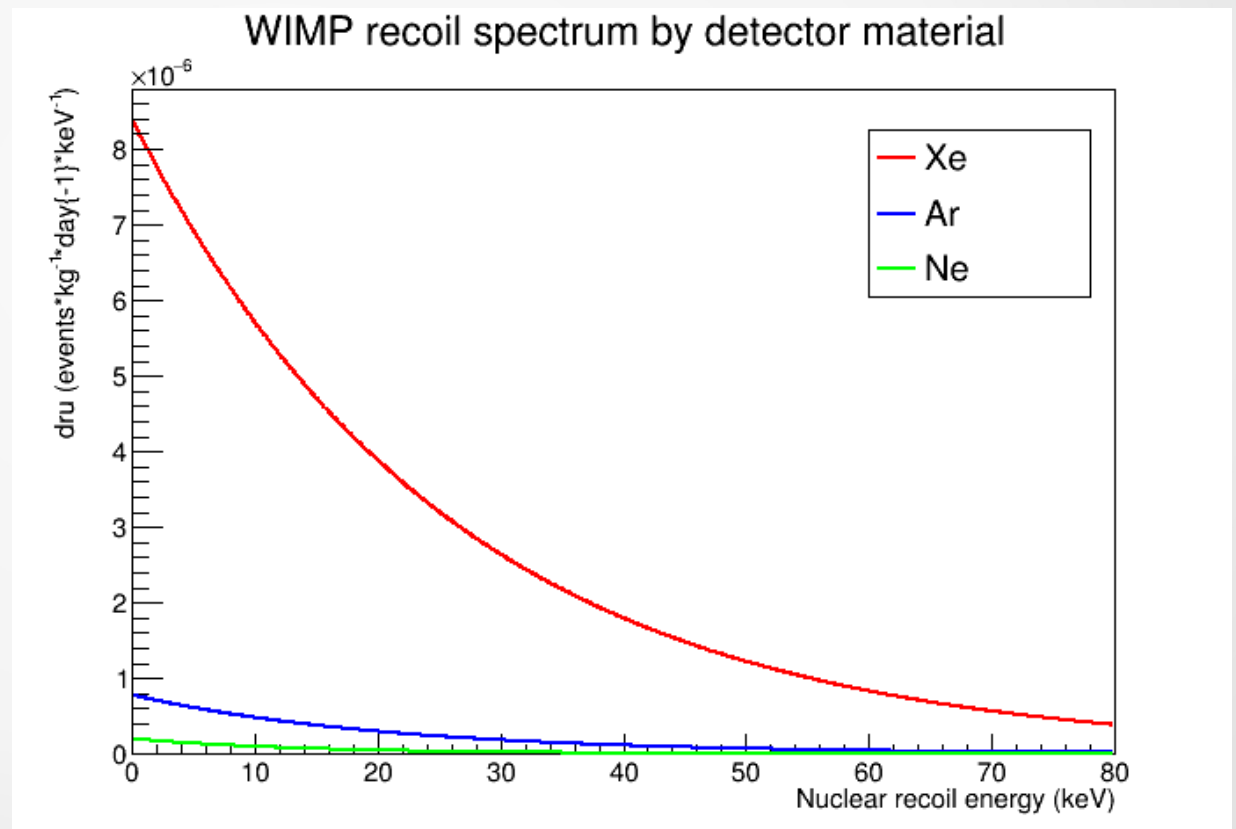
Ian Broderick

The LZ Detector



Unmodified Spectrum

- Simple exponential model
- Measured in events $\text{kg}^{-1}\text{day}^{-1}\text{keV}^{-1}$
- Assume largest non-excluded WIMP cross section (10^{-46} cm^2)

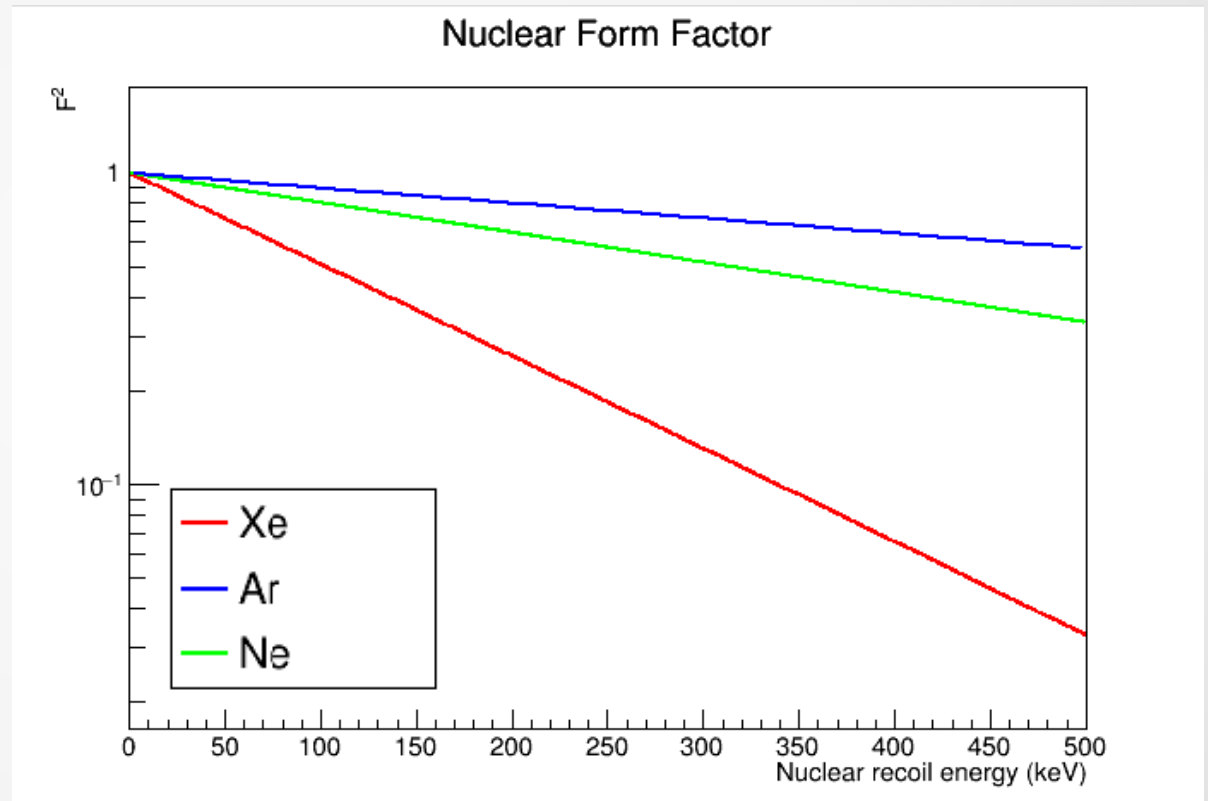


Modifications

- Nuclear form factor
- Depends on momentum transfer
- Target atomic mass

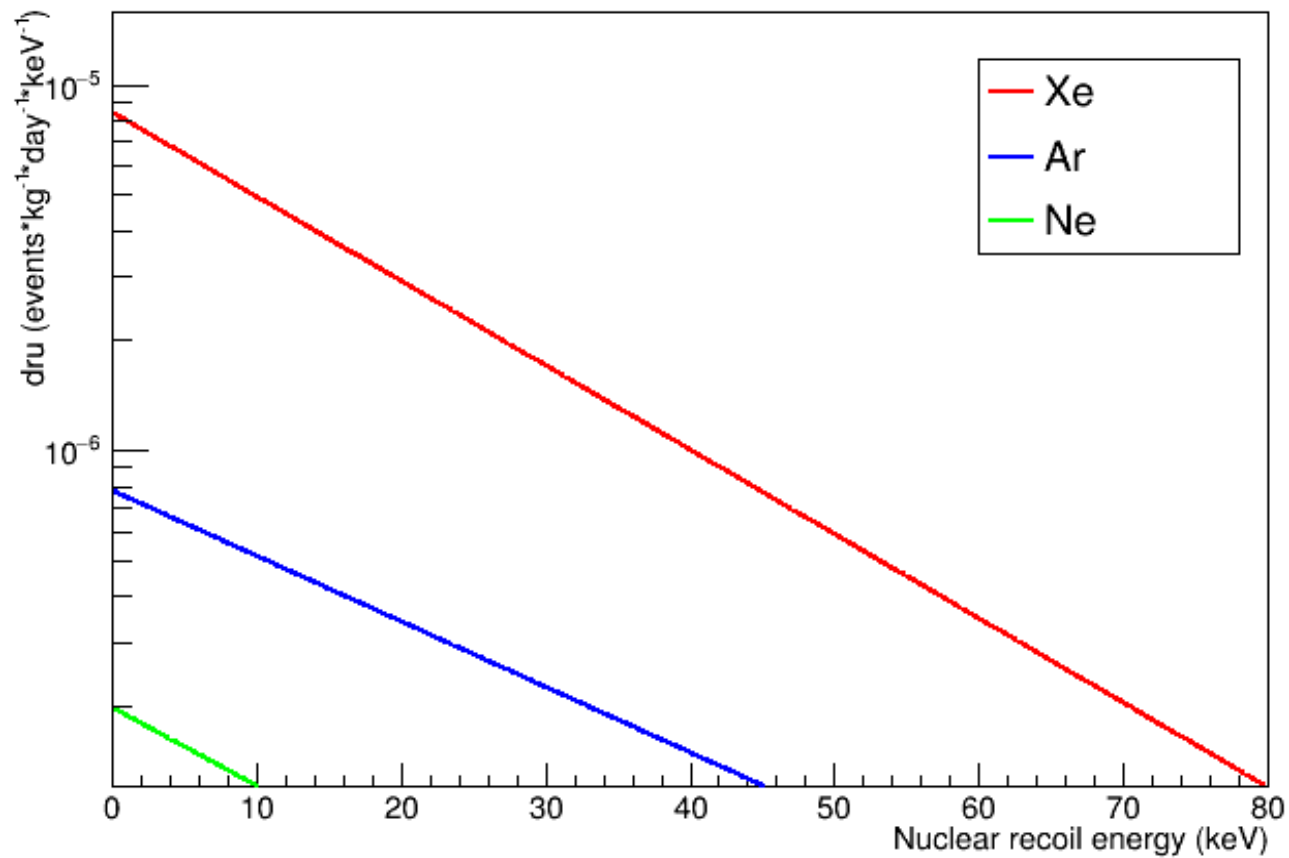
Moving earth correction

- Finite min and max velocity

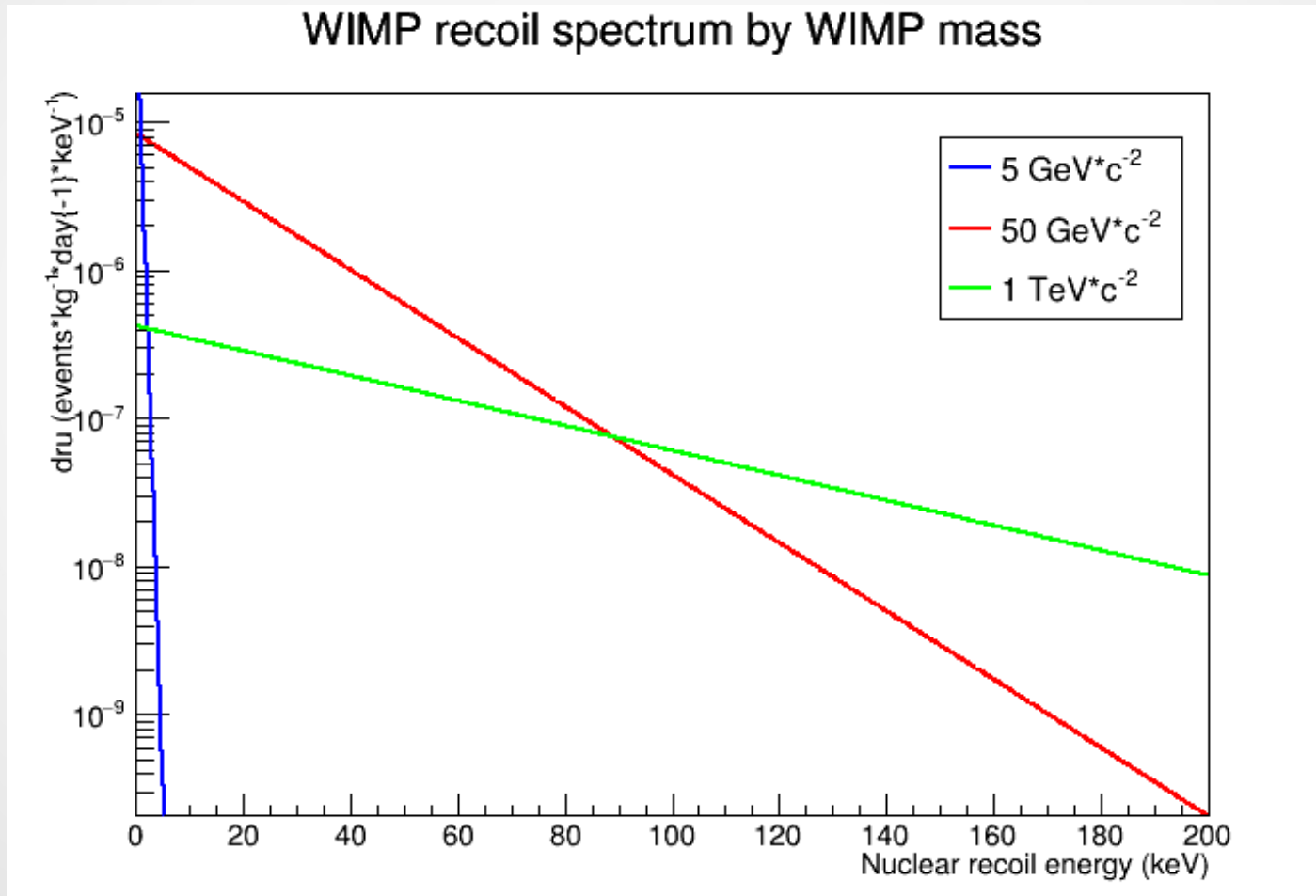


Spectra for various media

WIMP recoil spectrum by detector material

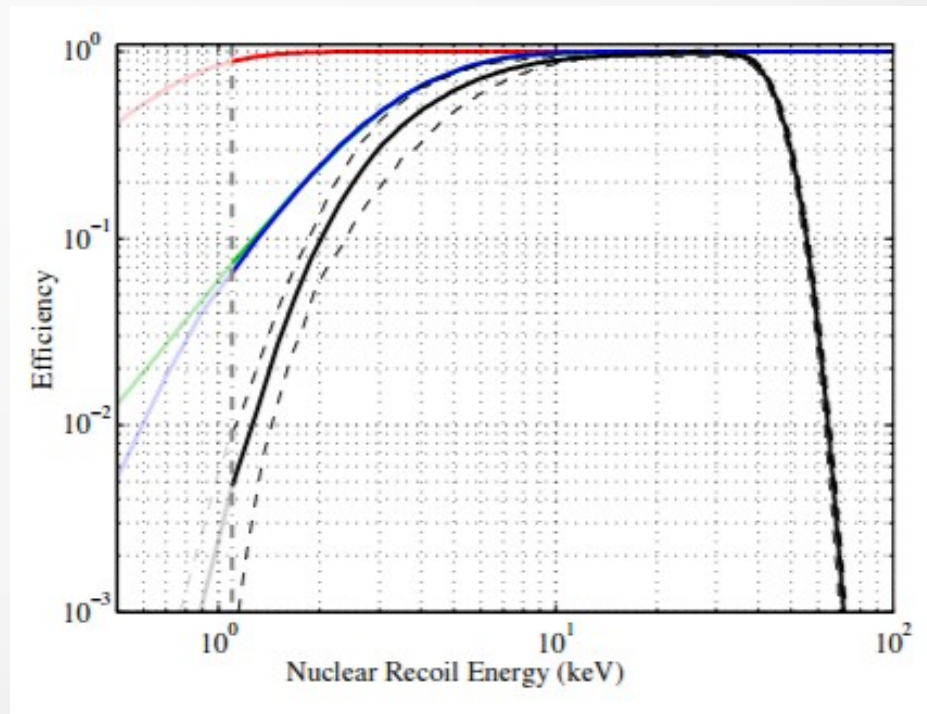


Spectra for various WIMP masses



Other Considerations

- Improve nuclear form factor
- Include detector efficiency
- Include spin dependence



References

The LZ Detector (2017). [Online; accessed April 27, 2017]

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