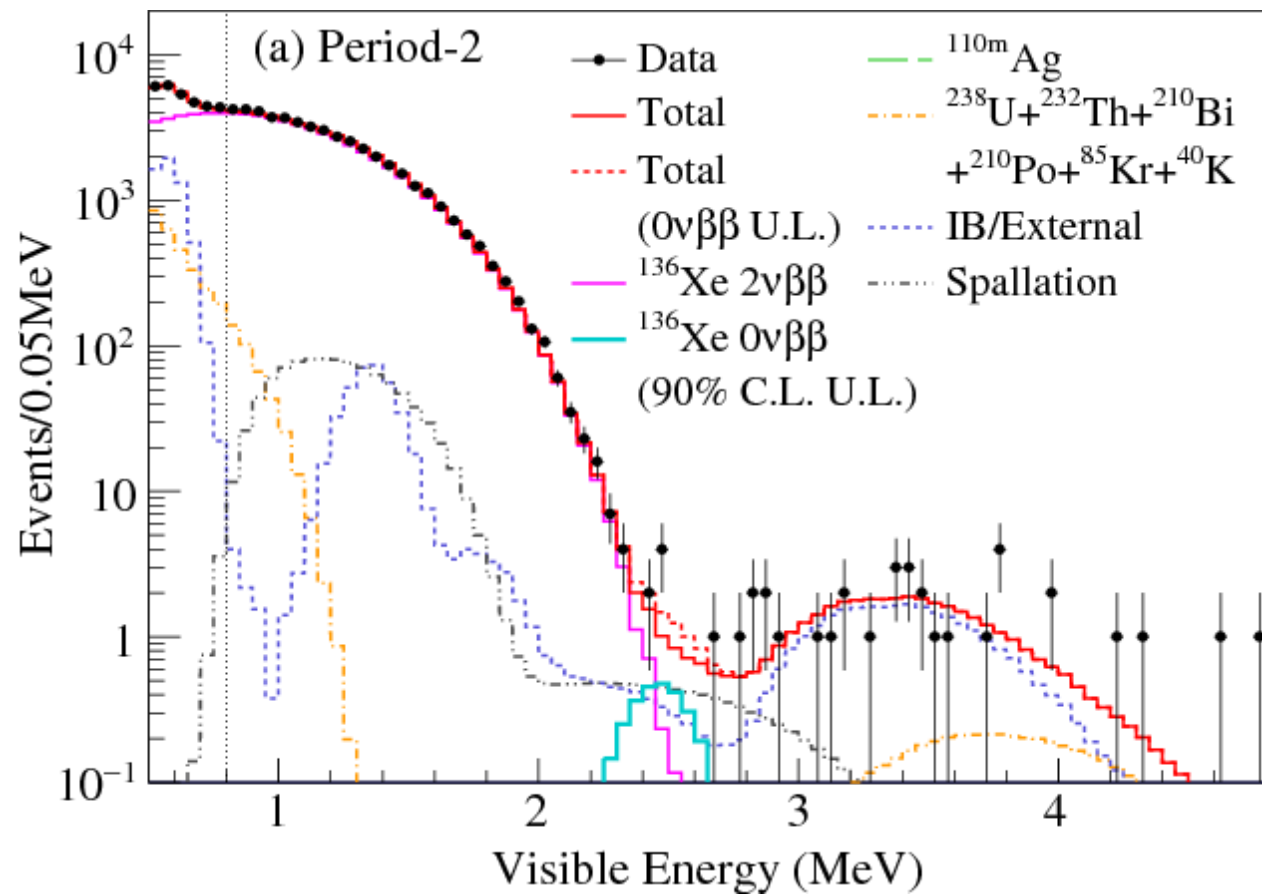
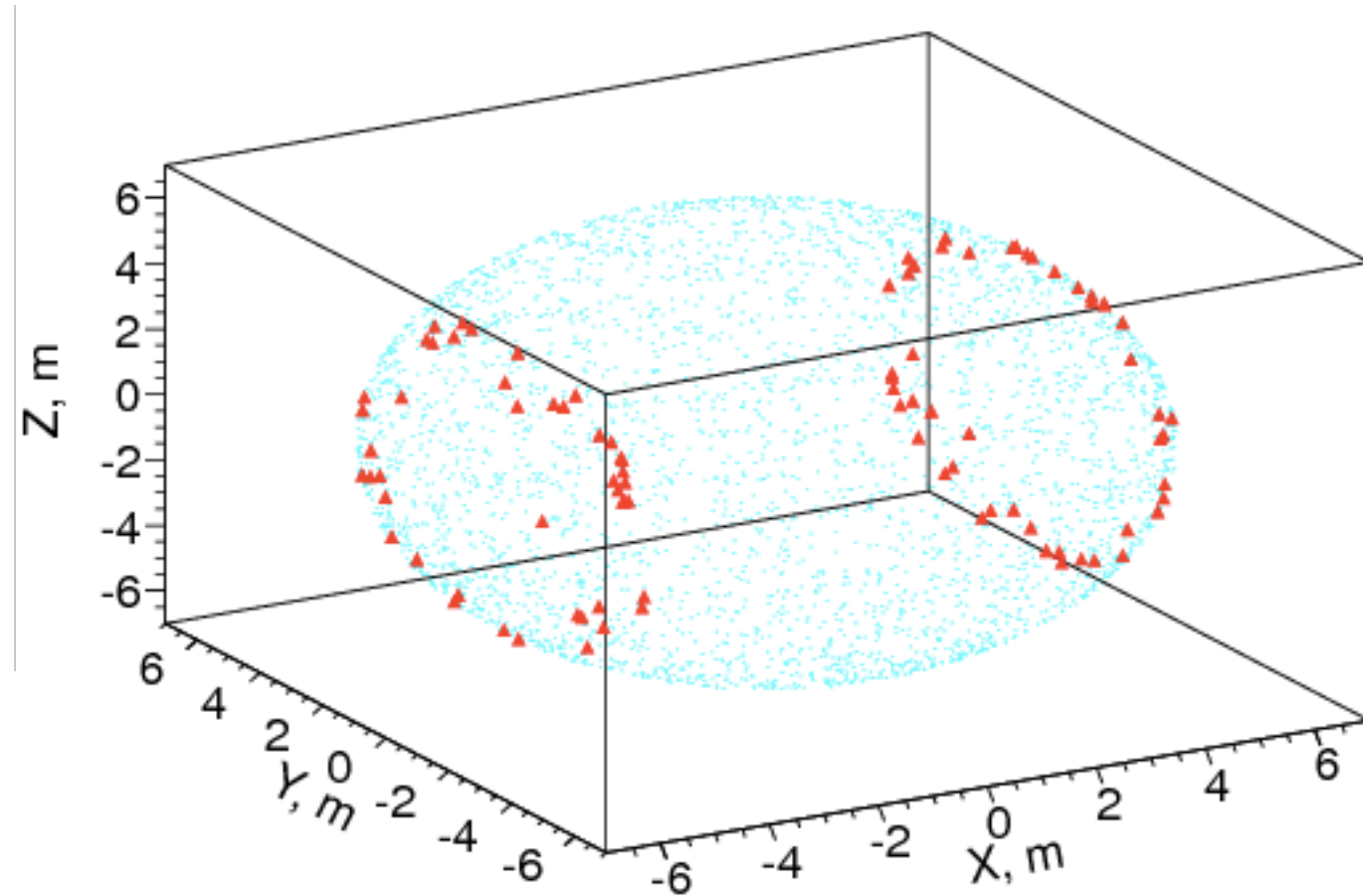


# Can we maintain energy resolution while increasing background rejection?



KamLAND-Zen  
Collaboration (Asakura, K.  
et al.) AIP Conf.Proc. 1666  
(2015) 170003 arXiv:  
1409.0077 [physics.ins-det]



| Isotope           | Endpoint (MeV) | Abundance (%) |
|-------------------|----------------|---------------|
| $^{48}\text{Ca}$  | 4.271          | 0.187         |
| $^{150}\text{Nd}$ | 3.367          | 5.6           |
| $^{96}\text{Zr}$  | 3.350          | 2.8           |
| $^{100}\text{Mo}$ | 3.034          | 9.6           |
| $^{82}\text{Se}$  | 2.995          | 9.2           |
| $^{116}\text{Cd}$ | 2.802          | 7.5           |
| $^{130}\text{Te}$ | 2.533          | 34.5          |
| $^{136}\text{Xe}$ | 2.479          | 8.9           |
| $^{76}\text{Ge}$  | 2.039          | 7.8           |

Possible future  
quantum dots

Common quantum  
dot materials

**Goal: Use quantum dots to load isotope, improve Cherenkov detection, and reject backgrounds by event topology.**

# Perovskite Quantum Dots are Promising Materials

## Absorption and Fluorescence Peaks

| Material            | Fluorescence (nm) | Absorption (nm) |
|---------------------|-------------------|-----------------|
| MAPbBr <sub>3</sub> | 435               | 415             |
| FAPbBr <sub>3</sub> | 433               | 433             |
| CsPbI <sub>3</sub>  | 582               | 554             |
| MAPbI <sub>3</sub>  | 576               | 566             |
| FAPbI <sub>3</sub>  | 573               | 569             |

## Light Yield at <sup>22</sup>Na Compton Shoulders (relative to 1g/L PPO in Toluene)

| Material            | 1275 keV | 511 keV |
|---------------------|----------|---------|
| MAPbBr <sub>3</sub> | 0.86     | 0.74    |
| FAPbBr <sub>3</sub> | 0.85     | 0.74    |
| CsPbI <sub>3</sub>  | 0.42     | 0.27    |
| MAPbI <sub>3</sub>  | 0.43     | 0.23    |
| FAPbI <sub>3</sub>  | 0.40     | 0.21    |

