Experiments Beyond the Tonne-Scale: Background Challenges - $2\nu\beta\beta$ pile-up



Random coincidences from $2\nu\beta\beta$ expected to be a dominant contribution over other sources of random coincidence; intrinsic to detector (bolometers)

(Note: The spectrum shown is analytical; not the exact spectrum shape that we would see in CUPID)

References

- Random coincidence of 2v2β decay events as a background source in bolometric 0v2β decay experiments - Chernyak et al, EPJC(2012) 72:1989
- A novel technique for the study of pile-up events in cryogenic bolometers -Andrii et al, arXiv 2011.11726v1



Evaluation Techniques:

- Simulation
- Pulse injection

Mitigation Techniques:

- PSA through usual indicators or ML
- Hardware development to speed up the detectors; eg
 - Changing NTD size
 - R&D toward use of TESes
 - Improving the baseline noise of the detector

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Figure Credit: Mattia

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