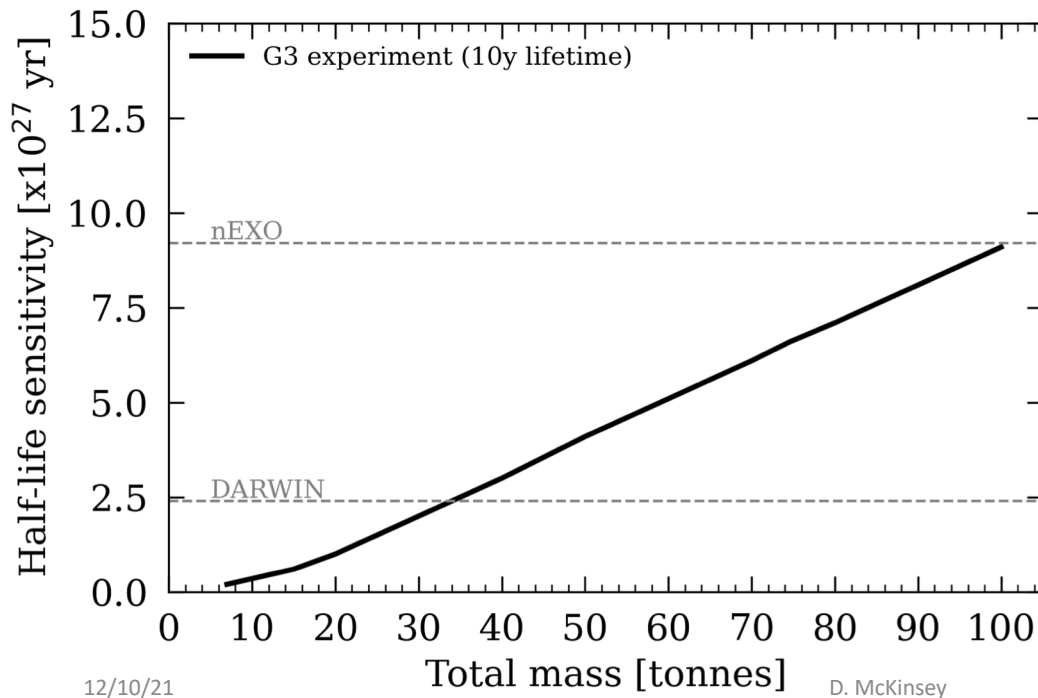


## Two-phase Xenon Generation-3 Sensitivity to Neutrinoless Double Beta Decay

- Sensitivity approach follows that used for the LZ sensitivity projection: **Phys. Rev. C 102, 014602**
- Materials backgrounds are based on measurements from the LZ radioassay program, scaled to a higher mass detector
- This approach highly leverages LXe self-shielding! The most problematic gamma-ray backgrounds are strongly attenuated
- Assumes 1-sigma energy resolution of 0.8%, as demonstrated by XENON1T and expected in LZ
- Neutrino, two-neutrino double beta decay, and neutron activation backgrounds also included.

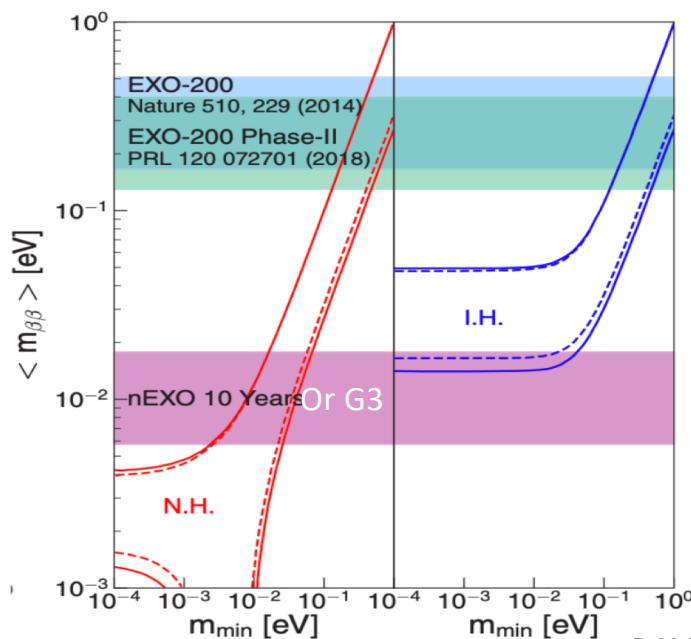


We essentially know how to build a 100-tonne scale 2-phase Xe detector, about twice the width/height of LZ. The biggest challenges are funding/ political:

- G3 needs support from the Snowmass process and P5 for its dark matter reach.
- The US OnuBB community has not been involved in 2-phase Xe detectors thus far, partly because of funding barriers but also because of the history of successful double beta decay technologies. So not much OnuBB community footprint.
- It is difficult for DOE to support the same project (or a given PI to work on a project) through both DOE-HEP and DOE-NP.
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12/10/21

D. McKinsey

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## Two-phase Xenon Generation-3 Sensitivity to Neutrinoless Double Beta Decay

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*[Submitted on 4 Oct 2021]*

# Kilotonne-scale xenon detectors for neutrinoless double beta decay and other new physics searches

A. Avasthi, T.W. Bowyer, C. Bray, T. Brunner, N. Catarineu, E. Church, R. Guenette, S.J. Haselschwardt, J.C. Hayes, M. Heffner, S.A. Hertel, P.H. Humble, A. Jamil, S. Kim, R.F. Lang, K.G. Leach, B.G. Lenardo, W.H. Lippincott, A. Marino, D.N. McKinsey, E.H. Miller, D.C. Moore, B. Mong, B. Monreal, M.E. Monzani, I. Olcina, J.L. Orrell, S. Pang, A. Pocar, P.C. Rowson, R. Saldanha, S. Sangiorgio, C. Stanford, A. Visser

Requires 0.5% resolution for LXe (within reach but needs R&D)

12/10/21

D. McKinsey