

Panel discussion: Uncovering the Mechanism of $0\nu\beta\beta$

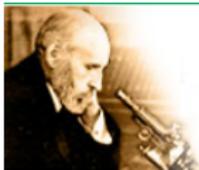
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**Snowmass Mini Workshop:
 $0\nu\beta\beta$ beyond the Ton scale
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Panel discussion: $0\nu\beta\beta$ beyond the ton scale

Uncovering the Mechanism of $0\nu\beta\beta$

Once one experiment detects $0\nu\beta\beta$ signal:

- 1 independent experiment(s) to confirm signal same isotope
- 2 independent experiment(s) to confirm $0\nu\beta\beta$ in different $\beta\beta$ nuclei

Both type of “confirmation” experiments bring information on $0\nu\beta\beta$ mechanism

- 1 Measurement of correlation between emitted e^- :
eg superNEMO, NEXT...
but many different mechanisms share same e^- signature

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Uncovering the Mechanism of $0\nu\beta\beta$

1 Measurement of $0\nu\beta\beta$ to excited 0^+ states:

- disfavored by phase-space factor 1-2 orders or magnitude
- additionally, $0_{gs}^+ \rightarrow 0_{exc}^+$ transition may be suppressed if different deformation between initial and final states
- $0_{gs}^+ \rightarrow 0_{exc}^+$ nuclear matrix elements (NMEs) not much explored theoretically

2 Measurement of $0\nu\beta\beta$ in two or more different $\beta\beta$ nuclei:

$$T_{1/2}(\text{nuc1})/T_{1/2}(\text{nuc2}) =$$

$$G(\text{nuc2})/G(\text{nuc1}) * M_{0\nu}^2(\text{nuc2})/M_{0\nu}^2(\text{nuc1})$$

- calculated ratios of NMEs agree better than individual NMEs between (phenomenological) many-body methods
- calculated ratios of NMEs not very sensitive to $0\nu\beta\beta$ mechanism with phenomenological approaches
- similar/different picture in ab initio calculations?