Physics with monochromatic neutrino beams from electron capture

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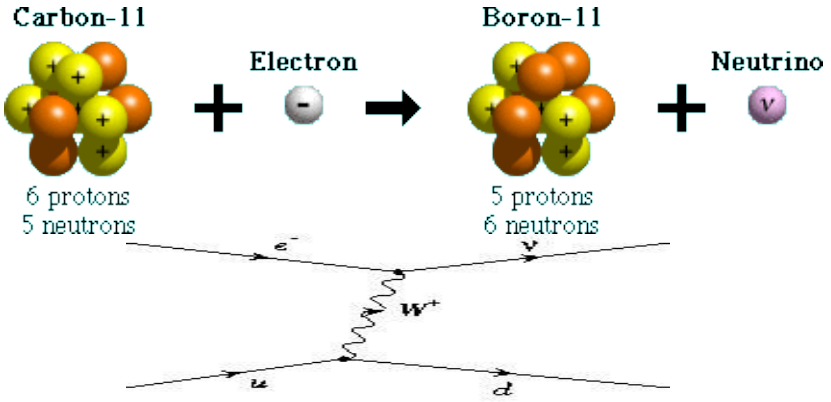
Electron capture:



flux: $\frac{d^2N_\nu}{dSdE} = \frac{\Gamma_{ec}}{\Gamma}\frac{N_{ions}}{\pi L^2}\gamma^2\delta(E-2\gamma E_0)$

branching ratio

very *peaked* energy spectrum (practically monochromatic)

Setup very similar to a beta-beam

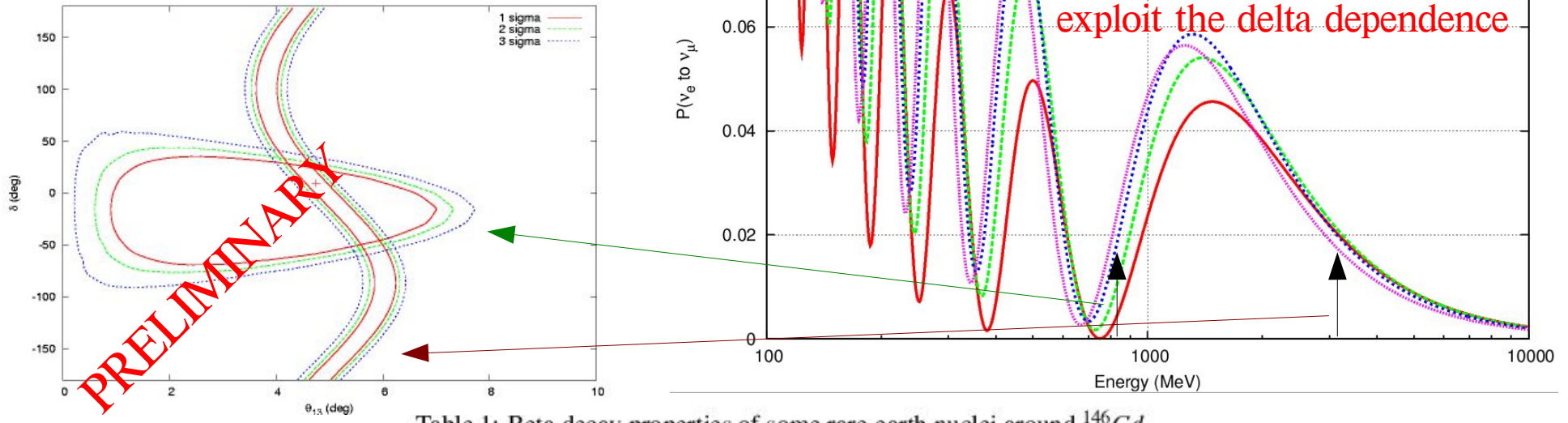


Table 1: Beta decay properties of some rare-earth nuclei around ^{146}Gd

Proposed:

Decay	$T_{1/2}$	$I_{\beta GR}$(%)	B(GT)($g_A^2/4\pi$)	E_{GR}(keV)	Γ_{GR}(keV)	E_ν=Q_{EC}-E_{GR}(keV)	ΔE_ν(keV)	EC/β^+(%)	Comments
^{148}Dy→^{148}Tb	3.1 m	96.2	0.46	620.2	—	2061.8	—	96/4	excellent!
^{150}Dy→^{150}Tb	7.17 m	100	0.32	397.2	—	1396.8	—	99.9/0.1	36% goes α
^{152}Tm 2^- →^{152}Er	8.0 s	≈50	0.48	≈4300	≈520	≈4400	≈520	45/55	
^{150}Ho 2^- →^{150}Dy	72.0 s	≈56	0.25	≈4400	≈400	≈3000	≈400	77/33	