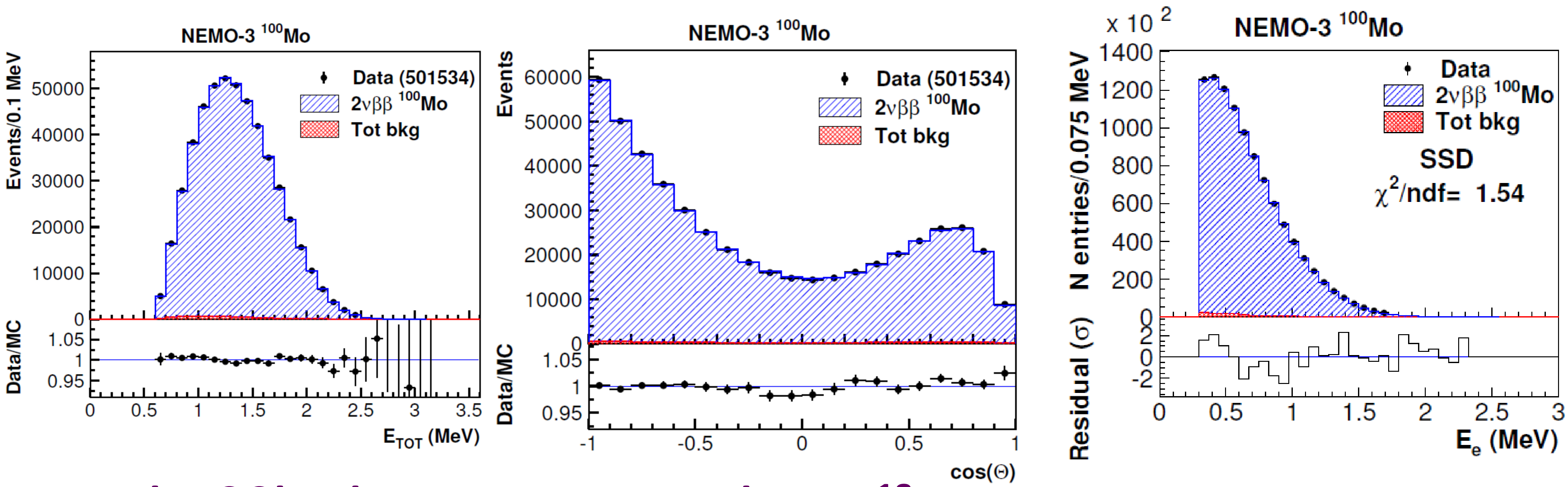
NEMO-3 : 2νββ RESULTS FOR ^{100}Mo

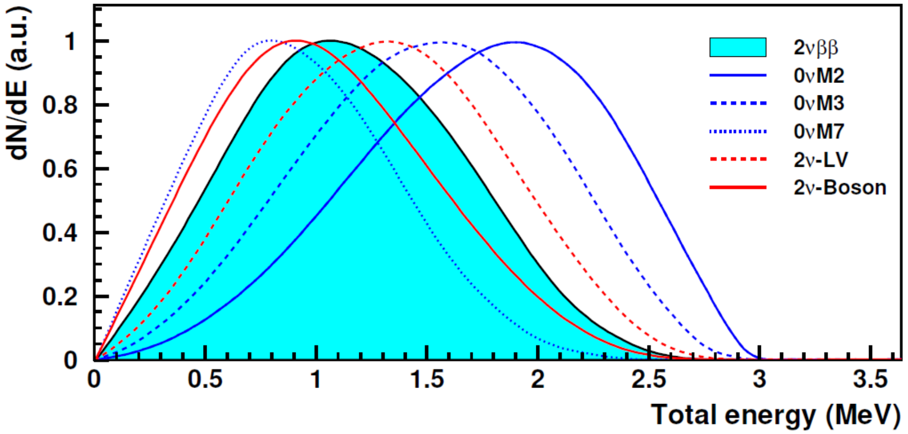


$T_{1/2}(2\nu\beta\beta) = (6.81 \pm 0.01 \pm 0.46) \times 10^{18}$ **years.**

The HSD (high intermediate state) model is excluded. The SSD (single state dominant) and SSD-1 (where the contribution of the first 1+ excited state is taken into account) are favoured.

NEMO-3 : SEARCH FOR MAJORONS AND EXOTIC PROCESSES WITH ^{100}Mo

NEMO-3 also investigated the majoron and exotic ββ decays for ^{100}Mo.



In various theoretical models the neutrinoless double beta decay can occur with the emission of a single or double majoron (massless or light boson with a coupling to neutrinos). Using ^{100}Mo, NEMO-3 provided one of the most sensitive constrain on the majoron coupling constant.

Spectral index	Mode	^{100}Mo	^{136}Xe	^{76}Ge
n=3	χ^0	0.013-0.035	0.06	0.047
n=3	$\chi^0\chi^0$	0.59-5.9	0.6-5.5	0.7-6.6
n=7	$\chi^0\chi^0$	0.48-4.8	0.4-4.7	0.8-7.1

Upper limits on the majoron coupling constant g_{ee}

The violation of the Pauli principle in the neutrino sector could be much stronger (neutral and very low mass particles). The double beta decay allows a sensitive test of the Pauli exclusion principle and statistics of neutrinos. NEMO-3 set limit on the bosonic component of the neutrino state :

$$\sin^2\chi < 0.27 \qquad (T_{1/2}^{b}(0^+ \text{ g.s.}) > 1.2 \times 10^{21} \text{ y})$$

The search for the bosonic neutrino is more promising when searching the $2\nu\beta\beta$ to the first 2^+_1 excited state.

The Lorentz invariance can be tested with double beta decay as its violation leads to energy spectra of emitted particles different from those in usual $2\nu\beta\beta$ process. NEMO-3 sets constrain on the Lorentz violation which can produce a positive or negative distortion of the spectrum :

$$-4.2\ 10^{-7} \text{ GeV} < \mathring{a}_{of}^{(3)} < 3.5\ 10^{-7} \text{ GeV}$$