but from minor side-chains which contribute only a very small fraction of the entire solar neutrino flux.)

One explanation of the results of these four experiments is that neutrino oscillations do take place during the transit from the production point in the sun to the interaction point in the earth. These oscillations may involve mixing either with ν_μ and ν_τ or "sterile" neutrino components. An appealing scenario is that of resonant neutrino oscillations, the Mikheyev-Smirnov-Wolfenstein (MSW) effect [25]. Details about this can be found in the reviews cited at the end of this note, and in the references in the original papers.

For some recent reviews on neutrino physics and further references to the original literature, see Refs. [15,26–29].

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Some other sources of information on neutrinos include topical neutrino conferences, and international high-energy physics and lepton-photon conferences.

ν_e

$J = \frac{1}{2}$

Not in general a mass eigenstate. See note on neutrino properties above.

These limits apply to ν_1, the primary mass eigenstate in ν_e. They would also apply to any other ν_j which mixes strongly in ν_e and has sufficiently small mass that it can occur in the respective decay. The neutrino mass may be of a Dirac or Majorana type; the former conserves total lepton number while the latter violates it. Either would violate lepton family number, since nothing forces the neutrino mass eigenstates to coincide with the neutrino interaction eigenstates. For limits on a Majorana ν_e mass, see the section on "Searches for Massive Neutrinos and Lepton Mixing," part (C), entitled "Searches for Neutrinoless Double-β Decay."

From the analysis of neutrino events from SN 1987A it is possible to get upper bounds on neutrino masses. For two examples of such studies, see Refs. 1 and 2 and references therein.

Our mass limit for ν_e is taken from the average in the ν_e "Mass Squared" section immediately below this section.

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