ENERGY LOSSES OF SOLAR NEUTRINOS

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ABSTRACT

Using the stopping power of matter, the effects of oscillations on the energy losses of solar neutrinos are investigated. The adiabatic and non-adiabatic survival probabilities of the neutrino oscillations, the mixing angles and Δm^2 are the parameters in the calculations. The total energy losses for ^8B neutrinos with maximum spectral energy of 14.06 MeV is 5×10^{-7} MeV and is slightly lower than the losses from the non-adiabatic conversion which is $\sim 7 \times 10^{-7}$ MeV. From the calculation, we found that the maximum total energy loss for solar neutrinos is of the order 10^{-6} MeV. We also include the effect of the plasmasphere of the Earth to the propagation of solar neutrinos. It is found that there is no significant contribution to the total energy losses of the neutrinos. We can conclude that the energy losses of solar neutrinos due to the ν_e-e scatterings could not solve the solar neutrino problem.

ABSTRAK

Dengan menggunakan kuasa penghenti jirim, kesan ayunan ke atas kehilangan tenaga neutrino matahari dikaji. Kebarangkalian adiabatik dan tak adiabatik untuk ayunan neutrino, sudut-sudut pencampuran dan Δm^2 adalah parameter di dalam pengiraan. Jumlah kehilangan tenaga untuk neutrino ^8B dengan tenaga spektral maksimum 14.06 MeV adalah 5×10^{-7} MeV dan ini adalah lebih rendah sedikit dari kehilangan tak adiabatik iaitu $\sim 7 \times 10^{-7}$ MeV tenaga. Dari kajian yang dilakukan didapati jumlah tenaga maksimum yang hilang untuk neutrino matahari adalah dalam tertib 10^{-6} MeV. Juga kesan plasmasfera bumi ke atas rambatan neutrino matahari dikaji. Didapati bahawa tiada sumbangan bermakna kepada jumlah kehilangan tenaga untuk neutrino tersebut. Boleh dibuat kesimpulan bahawa kehilangan bahawa kehilangan tenaga untuk neutrino matahari yang disebabkan oleh penyerakan ν_e-e tidak dapat menyelesaikan masalah neutrino matahari.