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Bi-large Neutrino Mixing See-Saw Mass Matrix with Texture Zeros and Leptogenesis

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Abstract: We study constraints on neutrino properties for a class of bi-large mixing See-Saw mass matrices with texture zeros and with the related Dirac neutrino mass matrix to be proportional to a diagonal matrix of the form diag(ε,1,1). Texture zeros may occur in the light (class a) or in the heavy (class b) neutrino mass matrices. Each of these two classes has 5 different forms which can produce non-trivial three generation mixing with at least one texture zero. We find that two types of texture zero mass matrices in both class a and class b can be consistent with present data on neutrino masses and mixing. None of the neutrinos can have zero masses and the lightest of the light neutrinos has a mass larger than about 0.046 eV for class a and 0.0027 eV for class b. In these models although the CKM CP violating phase vanishes, the non-zero Majorana phases can exist and can play an important role in producing the observed baryon asymmetry in our universe through leptogenesis mechanism. The requirement of producing the observed baryon asymmetry can further distinguish different models and also restrict the See-Saw scale to be in the range of 10^{12}∼10^{15} GeV. We also discuss RG effects on V_{13}.

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Key words: neutrino, neutrino mass matrix, neutrino masses and mixing, bi-large mixing matrix

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