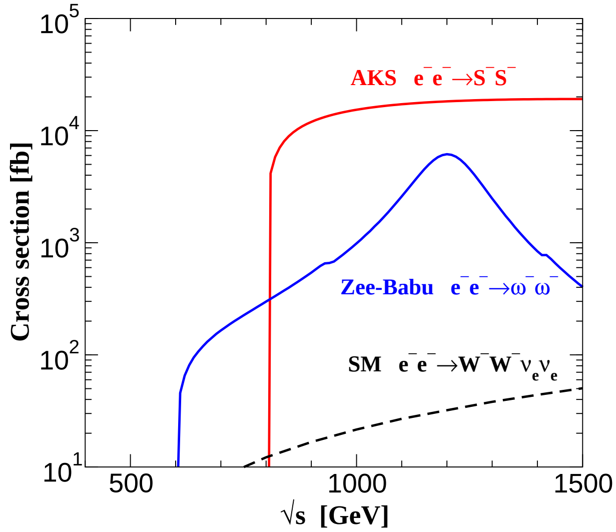

FIG. 5: The cross sections of like-sign charged Higgs pair productions in the Zee-Babu model ($\omega^-\omega^-$) and in the AKS model (S^-S^-) are shown as a function of the collision energy $\sqrt{s}$. The parameters in the Zee-Babu and the AKS model are taken as in Eq. (11) and Eq. (13), respectively.

than 10^{-4} fb because the coupling constants $\hat{h}_i^\alpha$ are very small in the parameters in Eq. (12). Allowing some fine tuning, $\hat{h}_i^\alpha$ may be at most 0.01 for heavier N_R^α. In any case, the cross section of $e^-e^- \to \xi^-\xi^-$ is smaller than 10^{-3} fb. Hence, most of the successful scenarios in the Ma model the process $e^-e^- \to \xi^-\xi^-$ is difficult to be seen. In the AKS model, the cross section of $e^-e^- \to S^-S^-$ is large, and its value amounts to about 15 pb at $\sqrt{s} = 1$ TeV in the scenario given in Eq. (13). Above the threshold, the magnitude of the cross sections are not sensitive to $\sqrt{s}$, so that even if $m_{S^\pm}$ would be at the TeV scale, we might be able to test it at future multi-TeV linear colliders, such as the Compact Linear Collider [35]. Because $B(S^\pm \to \eta^0 H^\pm) \simeq B(H^\pm \to \tau^\pm\nu) \simeq 100$ %, the signal should be $\tau^-\tau^-\nu\nu\eta\eta$ with almost the same rate as long as $m_{S^\pm} < m_{N_R^\alpha}$.

The background mainly comes from $W^-W^-\nu_e\nu_e$, and the cross section is about 2.3 fb (22 fb) for $\sqrt{s} = 500$ GeV (1 TeV). The branching ratio for the leptonic decay of W bosons is 30%, so that the rate of the final state $\ell\ell'\nu\nu\nu\nu$ is at most 2 fb or less. Therefore, the signal in the AKS model and in the Zee-Babu model can be seen.

Apart from the TeV-scale radiative seesaw models, there are many models with lepton number violating interactions or right-handed Majorana neutrinos. Atwood et al. have discussed the signature of heavy Majorana neutrinos in the model without Z_2 symmetry via