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Prioritized diagonal motion of electrons: Key role for high T_c in the iron-based superconductors KATSUHIRO SUZUKI, The University of Electro-Communications, HIDETOMO USUI, Osaka University, SOSHI IIMURA, YOSHIYASU SATO, SATORU MATSUISHI, HIDEO HOSONO, Tokyo Institute of Technology, KAZUHIKO KUROKI, Osaka University — Spin fluctuation is most likely to be the pairing glue in the iron-based superconductors, but its origin remains to be under debate. The presence of disconnected electron and hole Fermi surfaces having similar shapes and sizes in the lightly carrier doped systems naturally suggests that the Fermi surface nesting is the origin of the spin fluctuation. However, recent experiments on $Ln\mathrm{FeAsO}_{1-x}\mathrm{H}_x$ (Ln= La, Ce, Sm, Gd), where T_c exceeds 50K in the largely electron doped regime despite the degraded nesting, have brought about a renewed interest on the spin fluctuation origin. In the present study, we show that the spin fluctuation in the largely doped regime is enhanced by a peculiar motion of electrons due to the tetrahedral coordination of pnictogens; the next nearest neighbor (diagonal) hoppings between iron sites dominate over the nearest neighbor ones. We argue that this "prioritized" diagonal motion of electrons plays a key role in the occurrence of the high T_c.

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