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Spin cluster operator theory for the kagome lattice antiferromagnet[1] KWON PARK, KIAS, KYUSUNG HWANG, Seoul National Univ. and KIAS, YONG BAEK KIM, Univ. of Toronto and KIAS, JAEJUN YU, Seoul National Univ. — The spin-1/2 quantum antiferromagnet on the kagome lattice provides a quintessential example in the strongly correlated electron physics where both effects of geometric frustration and quantum fluctuation are pushed to their limit. Among possible non-magnetic ground states, the valence bond solid (VBS) with a 36-site unit cell is one of the most promising candidates. Improving the bond operator theory, we propose a new approach dubbed as the spin cluster operator theory in which extended clusters of spin are treated as fundamental building blocks of the system. As a result, it is shown that the lowest spin excitation has a gap much lower than the previous value obtained by the bond operator theory, narrowing the difference against exact diagonalization results.

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