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Electric-field-dependent plasmons in AA-stacked bilayer graphene YING-CHIH CHUANG, JHAO-YING WU, MING-FA LIN, Department of Physics, National Cheng Kung University, Tainan 701, Taiwan, CMPL TEAM — The collective excitations in AA-stacked bilayer graphene for a perpendicular electric field are investigated analytically within the tight-binding model and the random-phase approximation. Such a field destroys the uniform probability distribution of the four sublattices. This drives a symmetry breaking between the intralayer and interlayer polarization intensities in the intrapair band excitations. A field-induced acoustic plasmon thus emerges in addition to the strongly field-tunable intrinsic acoustic and optical plasmons. At long wavelengths, the three modes show different dispersions and field dependence. The definite physical mechanism of the electrically inducible and tunable mode can be expected to also be present in other AA-stacked few-layer graphenes.

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