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Optical states and tunable bandgaps for silicene, germanene and molybdenum disulfide LIUBOV ZHEMCHUZHNA, Hunter college, CUNY, ANDRII IUROV, Center for High Technology Materials, UNM, GODFREY GUMBS, Hunter college, CUNY, DANHONG HUANG, Air Force Research Laboratory, Kirtland Air Force Base — Closed-form analytical results are obtained for the energy dispersion and bandgaps when the electron states are dressed , i.e. the states which arise when an electron interacts with electromagnetic radiation having different polarizations. Our formalism applies to several recently discovered structures with gapped Dirac cones such as silicene, germanene, molybdenum disulfide and phosphorene. Each of these materials has a some type of symmetry breaking which is reflected in the energy band dispersions. Most importantly, we have found that the band gap may be either increased or decreased by adjusting the electron-photon interaction.

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