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Plasmons in a superlattice of spherical two-dimensional electron gases ANTONIOS BALASSIS, Fordham University, GODFREY GUMBS, ANDRII IUROV, Hunter College CUNY, DANHONG HUANG, Kirkland Air Force Base — A theory of collective plasma excitations in a linear periodic array of multi-shell spherical two-dimensional electron gases (S2DEGs) is presented. Coulomb coupling between electrons located on the same sphere and on different spheres is included in the random-phase approximation (RPA). Electron hopping between spheres is neglected in these calculations. The resulting plasmon-dispersion equation is solved numerically. Results are presented for a superlattice of single-wall S2DEGs as a function of the wave vector. The plasmon dispersions are obtained for different spherical radii and separations. We show that the one-dimensional translational symmetry of the lattice is maintained in the plasmon spectrum. Additionally, we compare the plasmon dispersion when the supperlatice direction is parallel or perpendicular to the axis of quantization. The S2DEG may serve as a simple model for fullerenes, when their energy bands are far apart.

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