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Interplay between curvature and in-plane magnetic field in bilayer graphene AVADH SAXENA, LANL, YOGESH JOGLEKAR, IUPUI — For a two-dimensional electron gas (2DEG) in a uniform magnetic field, the effect of the in-plane component on the orbital motion of carriers is ignored because "it can be gauged away." However, the effect of such a field on a massive quantum particle confined to a curved surface has been only recently explored [1]. We obtain the single-particle spectra for such a particle on a sphere, a cylinder, and a torus in the presence of a constant magnetic field. In addition to the geometric potential V_G that arises due to the confinement on a curved surface, we find that in-plane field leads to energy shifts $\Delta E \propto V_G(R/l_B)^4$ where R is the radius of curvature of the surface, and l_B is the magnetic length for the in-plane field. With bilayer graphene as a model for massive quantum particle on a curved surface, we estimate the energy shift for a cylindrical geometry, and show that it is significant for typical experimental parameters.

[1] G. Ferrari and G. Cuoghi, Phys. Rev. Lett. **100**, 230403 (2008).

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