

Abstract Submitted
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Paired states of crystalline electrons in two dimensions¹ FRANCISCO CLARO, DANIEL SOUZA, Pontificia Universidad Catolica de Chile — We show that in a perfect crystalline environment two electrons may pair to form a bound state. Such states form a band whose energy above the Bloch band center scales like the strength of the interaction. The pairs obey the dynamics of a composite particle. This is shown by considering an external electric field and verifying that there are Bloch oscillations corresponding to an object of charge $2e$. If the strength of the interaction is comparable to the band width, or smaller, the Bloch and paired states bands may overlap, suggesting that in the ground state a bosonic fluid could be formed. The pair problem is equivalent to that of a single particle in a 4D lattice with a surface. The paired states correspond to surface states in such equivalent problem and decay exponentially as the particles move away from each other.

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