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S-wave bound- and resonant states of two fermions in simple cubic lattice

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Bound two-electron pairs in a lattice are interesting as they may provide a better starting point for description of superconductivity when the average inter-particle distance is comparable to the size of the Cooper pair. Such pairs are also one of few examples of exactly soluble problems in the condensed matter field. The paper presents the properties of s-wave pairs in the three-dimensional lattice, what has been greatly facilitated by the invention of analytic expressions for the three dimensional lattice Green functions by Joyce. The results may be also related to the properties of bound- and resonant pairs of magnons in ferromagnets.