of the energy eigenvalues for a system with a Hamiltonian operator which has the following form in a cylindrical coordinate system \((\rho, \phi, z)\) after separation of the motion over the angle \(\phi\) (atomic units are used):

\[
E = \frac{1}{2}\left(\frac{\partial^2}{\partial \rho^2} + \frac{1}{\rho} \frac{\partial}{\partial \rho} + \frac{\partial^2}{\partial z^2}\right) + \frac{\mu \gamma}{\rho} - \frac{\mu^2}{2} + \frac{\mu^2}{2} - \frac{\mu^2}{2}I^2 - \frac{\mu^2}{2}I^2 - \frac{\mu^2}{2}I^2.
\]

Here, \(m\) is the magnetic quantum number, \(\gamma = \gamma_0\), and \(I_0 = 2.5 \times 10^5 \text{T}\).

In the \(\rho = 1\) and \(\epsilon = 1\) cases the energies can be found from the eigenvalues of Eq. (1) employing the expression

\[
\epsilon(x, \beta, \gamma) = \epsilon_0 \left(1 + \frac{\epsilon}{\beta} \right) - \epsilon_0 \left(1 + \frac{\epsilon}{\beta} \right)^{-\frac{1}{2}} - \epsilon_0 \left(1 + \frac{\epsilon}{\beta} \right)^{-\frac{1}{2}}
\]

The eigenvalues of Eq. (1) were found by the network approximation. In problems with a small number of coordinates the current network methods are superior to the traditional variational methods in respect of the wider range of applications and also in respect of the efficiency. The relative error in the energy determinations was approximately 10^{-5} and this was true also in the case of fairly large values of \(\epsilon\), in spite of the fact that for those values of \(\epsilon\) the extremely small radius of action of the attractive potential is not comparable with the slow fall of the wave function in the case of weakly bound states.

Detailed calculations of the dependences of the ionization energy \(E_0\) on \(\delta\) (for different values of \(\gamma\)) were made by us for the 1s, 2s, and 2p states. These states were characterized by the energy levels \(E_n\) = \(n^2\epsilon^2\), where one of the possible solutions was set equal to zero, it was possible to compare the results with the published numerical investigations. For \(\gamma = 0\) our results agreed fully with those of Ref. 3. In the case of \(\delta = 0\) and \(\gamma = 0\) any comparison with one calculation could not be complete because up to now the energies of the low-lying levels of the hydrogen atom have not been calculated by the same method throughout the range of values of \(\gamma\) of interest. Our results are very close to those of more accurate calculations carried out in the range of the highest reliability of the latter.

Figure 1 shows some of the dependences \(E_n(\delta)\) for the ground state obtained in our calculations or from approximate expressions.\(^8\) We can see that the estimate \(E_0 = 2\int \Sigma 1/2\) given in Ref. 4 for \(\delta = 0\) \(\gamma\) describes well the asymptotic behavior of \(E_0\) to the limit \(\delta \rightarrow \infty\) when \(\gamma \leq 1\), i.e., in the range of validity of the adiabatic approximation.\(^8\) The dependence \(E_0 = \epsilon_0 \delta^2/2\) applies also in lower order for which the numerical values of \(E_0\) are no longer reliable, in the case of \(\epsilon_0\) estimated from Ref. 9 for the range \(1 < \epsilon_0 < 10\) the graph of \(E_0(\delta)\) intersects the dependence \(E_0 = \epsilon_0 \delta^2/2\) along the range that the estimate employed can hardly be correct.

The 2s and 2p states differ in respect of their exact symmetry relative to the reflection in the \(\rho \pm 0\) plane.
Anomalies of the Hall coefficient in the region of a negative temperature coefficient of the resistance of disordered Ti-Cr alloys

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It is well known that disordered alloys of transition metals based on titanium are characterized, in a certain range of compositions, by anomalously high values of the residual resistance and by a negative temperature coefficient of the resistance. It has been shown that these anomalous features are specific to metallic alloys and are sensitive to the electronic structure of the alloy. The most popular model for explaining these effects is the Mott model, which assumes that the anomalous behavior is due to the pseudogap near the Fermi level. This model is well-supported by experiments, and it is widely used in the literature to describe the behavior of disordered alloys.

The Hall coefficient is another important physical property of materials exhibiting a pseudogap near the Fermi level. It is characterized by the fact that near it the density of states reaches values of 200-250 states/cm³, which corresponds to a maximum of the Hall coefficient. This behavior is observed in a narrow range of compositions, by anomalously high values of the Hall coefficient of the resistance changes from positive (in the range of compositions near the Fermi level) to negative (for x > xc) (Ref. 2).

It follows from Eq. (1) that when the strong limit is obtained, the composition dependence of the Hall coefficient is governed by the composition dependence of the density of states at the Fermi level of the alloy. This is well-supported by experiments, and it is widely used in the literature to describe the behavior of disordered alloys.

Figure 2 shows the composition dependence of the Hall coefficient obtained for the Ti-Cr alloy system. As shown in Ref. 4, the Hall coefficient is well-described by the Mott model, which assumes that the Hall coefficient is proportional to the density of states at the Fermi level. This is consistent with the results of the measurements presented in Fig. 1. It is clear that the composition dependence of the Hall coefficient is a sensitive probe of the electronic structure of disordered alloys.

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