However basing the scattering state asymptotic we exploited an assumption of correlated impurity configurations which had no solid theoretical prove.

Another important request to the theory of hopping magnetoresistance was related to 2D hopping. As we have mentioned above, the theoretical model of [5] exploited 3D localized wave functions which do not hold for typical experiments for doped quantum wells where the wave functions have 2D character. Then, we should mention a new important experimental results [11],[12] obtained for selectively-doped quantum well structures where both centers of the wells and centers of the barriers were doped ensuring a formation of the upper Hubbard band. These structures demonstrated a suppression of negative magnetoresistance with a decrease of temperature for the samples with higher degree of doping. Although we attempted to explain this behavior in a similar way as for 3D structures in [6], it hardly works because of an important difference between 2D and 3D physics.

In what follows we will give a consistent description of magnetoresistance in both 3D and 2D structures including different orbital and spin mechanisms. An important conclusion of ours is that in most occasions one deals with a "weak scattering case" rather than with "strong scattering case". If we are restricted to the lower Hubbard band, the decisive factor is related to the presence of charged centers outside of the "cigar region" not involved into interference. The random potential imposed by these centers restricts the extension of the hydrogen-like asymptotics of the scattering centers up to the distance to the closest charged center while outside this region the preexponential of the asymptotics appears to be similar to the one for the potential well case ("weak scattering limit"). For the case of the states within the upper Hubbard band an additional factor is related to the non-Coulombic potential of the scattering center which is also of a short-range character. The resulting picture of hopping magnetoresistance appears to be different from the one suggested in [5] (based on the pure Coulomb wave functions) and from the one of [2] (exploiting the assumption of large number of intermediate scatterers). We also emphasize a role of spin mechanisms of positive magnetoresistance which can dominate over wave-shrinkage magnetoresistance at low temperature. In this concern a special analysis is given to spin mechanisms for acceptor centers which have an important differences with respect to the earlier discussed case of donor impurities.