ion reads:

$$-\left\{\frac{1}{4}-\frac{n}{\rho}+\frac{l(l+1)}{\rho^2}\right\} R = 0. \quad (3)$$

$$e^{-\frac{1}{2}\rho}\,\rho^l\,F(\rho), \quad (4)$$

$$-\rho)\frac{dF}{d\rho}+(n-1-l)\,F=0 \quad (5)$$

netic function *)

$$+\,1-n,\,2l+2,\,\rho). \quad (6)$$

e series expansion for F breaks off so
guerre polynomials. The wave function
, being the normal boundary condition

le is to calculate how the 1s, 2s and 2p
om are changed when it is uniformly
le lies at finite r_0. The energy levels are
ough the influence of the potential wall.
ergy E and radius r_0 of the cage will be
ige beginning with the large values of r_0.
l 2p level" will be maintained, although
teger for $r_0 = \infty$. The quantum number
by compression.

chels, De Boer and Bijl. For a
deviation of E from its value at $r_0 = \infty$
hels, De Boer and Bijl [1]) have
ve method. They calculated the shift

$$\frac{\alpha}{\gamma}\rho+\frac{\alpha(\alpha+1)}{\gamma(\gamma+1)}\frac{\rho^2}{2!}+\ldots. \quad (7)$$

ictions have specially been investigated by Whitt-
mbols k, m and z with the variables l, n, and ρ used
p. Buchholz' [4]) parameters $\nu \equiv i\tau$, p and $z \equiv i\zeta$

this notation by N and the second by l, the number N
vave function "Nl" has $N-l-1$ nodes between its
uantum number" N coincides with the variable n
2)) for $r_0 = \infty$ only.

of the ground state 1s, but their method can easily be extented to the higher levels. Here it will also be calculated for the 2s and 2p levels.

Putting $F(\rho)=\sum_{\tau=0}^{\infty} b_\tau \rho^\tau$ and inserting this in the differential equation the following recursion formula is obtained:

$$\tau(\tau+2l+1)\,b_\tau=(\tau+l-n)b_{\tau-1}. \quad (8)$$

If n is an integer the series breaks off and gives a polynomial of the degree $n-l-1$. In that case the wave function has a zero point at $r_0=\infty$. If however r_0 is not infinite, but still large enough that n is nearly an integer, we can put

$$n = N + \beta \text{ with } N \text{ integer and } |\beta| \ll N \quad (9)$$

and

$$E=-\frac{1}{2n^2}=-\frac{1}{2(N+\beta)^2}\simeq-\frac{1}{2N^2}+\frac{\beta}{N^3}, \quad (10)$$

where the first term in the last member represents the energy value for $r_0=\infty$.

Substituting this in the recursion formula (8) and applying $|\beta|\ll N$, approximations for the coefficients b_τ are found. With the boundary condition that, for finite r_0, reads:

$$F(\rho_0)=0, \quad (11)$$

one can easily find the first order correction for the 1s-level, where $N=1$ and $l=0$:

$$\beta_{1s}\simeq\frac{1}{\sum_{\tau=1}^{\infty}\frac{1}{\tau(\tau+1)!}\rho_0^\tau}\simeq\frac{1}{\sum_{\tau=1}^{\infty}\frac{2^\tau}{\tau(\tau+1)!}r_0^\tau}, \quad (12)$$

the formula of Michels, De Boer and Bijl.

The calculations for the 2s and 2p levels, where $N=2$ and $l=0$ and 1, yield:

$$\beta_{2s}\simeq\frac{\frac{1}{2}\rho_0-1}{-\frac{1}{2}\rho_0+\sum_{\tau=2}^{\infty}\frac{1}{\tau(\tau-1)\cdot(\tau+1)!}\rho_0^\tau}\simeq\frac{\frac{1}{2}r_0-1}{-\frac{1}{4}r_0+\sum_{\tau=2}^{\infty}\frac{1}{\tau(\tau-1)\,(\tau+1)!}r_0^\tau}, \quad (13)$$

$$\beta_{2p}\simeq\frac{1}{6\sum_{\tau=1}^{\infty}\frac{1}{\tau(\tau+3)!}\rho_0^\tau}\simeq\frac{1}{6\sum_{\tau=1}^{\infty}\frac{1}{\tau(\tau+3)!}r_0^\tau}. \quad (14)$$

Michels, De Boer and Bijl found the energy values of