TABLE IV

The 2p-level ($N = 2$, $l = 1$)

n	E atomic units	r_0 atomic units	from section
2	—0.1250	∞	3*a*
2.047	—0.1193	10.235	3*b*
2.135	—0.1097	8.540	3*b*
2.363	—0.0895	7.089	3*b*
2.5	—0.0800	6.701	3*b*
2.599	—0.0740	6.497	3*b*
3	—0.0566	6.000	3*a*
3.5	—0.0408	5.696	3*b*
4	—0.0312	5.528	3*a*
5	—0.0200	5.355	3*a*
∞	0	5.086	3*c*
4 *i*	0.0312	4.770	3*d*
3 *i*	0.0556	4.554	3*d*
2 *i*	0.1250	4.110	3*d*
i	0.5000	2.698	3*d*
0.778 *i*	0.8261	2.528	3*d*
0.445 *i*	2.524	1.68	3*f*
0.401 *i*	3.116	1.55	3*f*
0.356 *i*	3.943	1.41	3*f*
0 *i*	∞	0	3*e*

$n - l - 1$ nodes between the points $r = 0$ and $r = \infty$. For several values of n and for $l = 0$ and 1 zero points have been calculated and given in tables II–IV (indication § 3*a*) and represented in the figures 1–3. Here again the splitting up of the second level into 2*s* and 2*p* curves is evident. It is obvious that by using only integer values of n a large gap in the curves is left between $n = l + 1$ and $n = l + 2$ i.e. between $r_0 = \infty$ and a comparatively small value of r_0. On the side of large radii r_0 this gap could be filled by the method of § 2, but this gives only approximative values.

b) For the rest of the gap in the curve it is necessary to find zero points of the confluent hypergeometric function with real arguments. These can be interpolated from tables [6]) [7]) with the help of well-known interpolation procedures (v. tables II–IV and figures).

c) $E = 0$. The limiting case of $n \to \infty$ has been studied by Sommerfeld and Welker [2]), especially for the 1*s* level. The confluent hypergeometric function (6) for $n \to \infty$ is proportional to a Bessel function:

$$\lim_{n \to \infty} F(l + 1 - n, 2l + 2, \rho) \backsim J_{2l+1}(2\sqrt{\rho n}) = J_{2l+1}(2\sqrt{2r}). \quad (24)$$