THE SCOTT CORRECTION FOR ATOMS ACCORDING TO BROWN AND RAVENHALL

H Siedentop
Mathematisches Institut
Ludwig-Maximilians-Universität München
Theresienstraße 39
80333 München, Germany

The talk presents recent joint work with Ruper Frank and Simone Warzel. We prove Scott's conjecture for the Brown-Ravenhall operator $B_{c,Z}$ of heavy, i.e., relativistic, neutral atoms of atomic number Z. More specifically we will show that – uniformly in $c/Z \in [0, 2/(\pi/2 + 2/\pi)$ and $Z \geq 1$ – the following asymptotic expansion holds:

$$\inf \sigma(B_{c,Z}) = E_{\mathrm{TF}}(Z) + (1/2 - s(c/Z))\, Z^2 + O(Z^{47/24}).$$

Here, $E_{\mathrm{TF}}(Z)$ is the atomic Thomas-Fermi energy, $s(\kappa) = \kappa^{-2} \sum_{\nu=1}^{\infty} (e_\nu^S - e_\nu^B)$, i.e., the sum of the differences of the hydrogenic Schrödinger eigenvalues and the hydrogenic Brown-Ravenhall eigenvalues; c is a parameter, physically the velocity of light.