$$\text{Mass excess} = \text{T.F.} + M_n N + M_H Z + \text{Shell Correction} + \text{Even-odd Term} + \text{Wigner Term} - 0.00001433 Z^{2.39}\ \text{MeV} \quad . \tag{20}$$

Here T.F. is the calculated binding energy in the Thomas-Fermi model and M_n, M_H are the masses of the neutron and of the Hydrogen atom. The "Shell Correction" is taken from [26] (column headed E_{mic}).

For the even-odd term we took $\pm 11/\sqrt{A}$ MeV for odd or even nuclei and zero for odd-mass nuclei, as in [25]. We also reverted to the 1965 form of the Wigner term: -7 MeV $\exp(-6\,|N-Z|/A)$. The last term in Eq. 20 allows for the binding energy of the atomic electrons. Using the measured mass excesses of 1654 nuclei, we used Eq. 20 to convert them into experimental macroscopic binding energies (i.e., energies corrected for shell effects, the even-odd term, the Wigner term and electronic bindings) which then served as a "target" for the macroscopic Thomas-Fermi theory. The RMS deviation of the calculated and target binding energies was then minimized with respect to five variables. (Five and not six because one combination of the six adjustable parameters was always constrained in such a way that the surface width b_0 of standard semi-infinite nuclear matter would have the value 1.0 fm.)

I skip the technical details of these fits, which you can imagine are pretty formidable, considering that one is trying to fit 1654 nuclear masses (each one requiring for its determination up to a dozen iterations of coupled neutron and proton densities) by searching in a space of 6 parameters, with a constraint whose formulation requires another iterative Thomas-Fermi solution of a semi-infinite distribution. However, by using some tricks and shortcuts, we succeeded. The resulting optimum parameters and associated nuclear properties are listed in Section 4. The final RMS deviation for the 1654 masses was 0.711 MeV. Figure 7 compares the residual deviations between measured and calculated masses for the shape-dependent Droplet Model [26], (RMS = 0.681 MeV), and for the present Thomas-Fermi model.

Having optimally fitted the ground state masses by varying parameters that include the radius constant r_0, two crucial questions present themselves: Will the nuclear sizes disagree