approximation provides a wonderful pocket theory of atomic (and molecular) properties, averaged over shell effects [5].

This statistical approximation has also been applied to nuclei. As in the atomic case various improvements have been explored subsequently, bringing in density-gradient corrections and other refinements [6] and [7-13]. The most systematic such improvements are based on a formal expansion in powers of $\hbar$ [14].

Our own work takes as its starting point the 1961 and 1963 straightforward Thomas-Fermi model of Seyler and Blanchard [15]. We too have tried various refinements of the basic Thomas-Fermi method [16, 17], but have finally decided to exploit fully the simple beauty of the original theory when aiming at a comprehensive description of a vast amount of data [18, 19]. (A comprehensive discussion of fission barriers becomes very difficult if one attempts to go beyond the basic Thomas-Fermi theory.) We have, however, improved the Seyler-Blanchard four-parameter nucleon-nucleon force [20, 21]. With two additional adjustable parameters in the force we can now give an excellent account of (shell-corrected) ground-state masses of some 1600 nuclei, as well as provide a fair description of nuclear density distributions and fission barriers. With a seventh parameter added we can also remove a serious blemish of the Seyler-Blanchard model by giving an acceptable account of the depth of the nuclear optical model potential, including its energy and isospin dependences. Having finally, after several years, frozen the adjustable parameters of the model, we are now going on with the working out of its consequences in every conceivable situation, especially for nuclei subjected to various extreme conditions. In the present talk I will describe our model and some of the currently available results.

2. The model

The total energy of a nucleus is written as an integral over all space of an energy density $\mathscr{E}(\bar{r})$, and consists of a standard Thomas-Fermi kinetic energy and an interaction energy, Coulomb plus nuclear [20]. (In the Coulomb energy we have now included the exchange