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Looking at nuclei in the black sphere picture AKIHISA KOHAMA, RIKEN, KEI IIDA, RIKEN BNL Research Center, KAZUHIRO OYAMATSU, RIKEN & Aichi Shukutoku University — We review our method for systematically analyzing proton elastic scattering data for stable nuclei, by assuming that the target nucleus is a "black" sphere. This method gives a length scale, a, the values of which are determined so as to reproduce the angle of the first diffraction maximum in the scattering data. We find that the absorption cross section, πa^2 , agrees with the empirical total reaction cross section for C, Sn, and Pb to within error bars for proton incident energies, T_p , higher than ~ 800 MeV. Our preliminary results suggest that this agreement is retained for T_p down to a few hundreds MeV. For $T_p > \sim 800$ MeV, we also find that $\sqrt{3}/5a$ almost completely agrees with the empirically deduced values of the r.m.s. matter radius for nuclei having mass larger than about 50, while it systematically deviates from the deduced values for $A \ll 50$. This tendency suggests a significant change of the nuclear matter distribution from a rectangular one for $A \ll 50$. Possible application of our method to neutron-rich unstable nuclei is finally discussed.

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