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Nuclear Structure and Scattering in ^{20}Ne , ^{44}Ti , ^{94}Mo and ^{212}Po

We investigate the nuclear structure and elastic scattering in nuclei (^{20}Ne , ^{44}Ti , ^{94}Mo , and ^{212}Po) using a model of alpha-cluster orbiting a closed shell core. A purely phenomenological cluster-core potential was found to provide a successful description of low lying positive parity spectra, electromagnetic transition strengths of these nuclei and alpha-decay rates of these states in ^{212}Po . We then consider the same phenomenological potential as the real part of optical model to describe the differential elastic scattering cross-sections for the systems corresponding to $^{20}\text{Ne} = ^{16}\text{O} + \alpha$, $^{44}\text{Ti} = ^{40}\text{Ca} + \alpha$, $^{94}\text{Mo} = ^{90}\text{Zr} + \alpha$, $^{212}\text{Po} = ^{208}\text{Pb} + \alpha$.

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