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# Elastic and inelastic electron-nucleus scattering form factors of some light nuclei: ($^{23}$Na, $^{25}$Mg, $^{27}$Al, and $^{41}$Ca)

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Nuclear structure (energy levels, elastic and inelastic electron-nucleus scattering, and transition probability) of 23Na, 25Mg, 27Al, and 41Ca nuclei have been studied using shell-model calculations. A set of two-body interactions are used in this paper. The universal *sd* of the Wildenthal interaction in the proton-neutron formalism, universal *sd*-shell interaction A, universal *sd*-shell interaction B, and GXFP1 interaction for the *fp* shell is used with the nucleon-nucleon realistic interaction Michigan three-range Yakawa as a two-body interaction for core-polarization calculations. Two shell-model codes, CPM3Y and NUSHELL for Windows, have been used to calculate the results. The wave functions of radial single-particle matrix elements have been calculated with harmonic-oscillator and Woods-Saxon potentials. The level schemes are compared with the experimental data up to 5.776, 5.251, and 4.51 MeV for 23Na, 25Mg, and 27Mg, respectively. Very good agreements are obtained for all nuclei in this study. Results from electron scattering form-factor calculations have shown that the core-polarization effects are essential to obtain a reasonable description of the data with no adjustable parameters.

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