^{9}Be(^{36}Ca,^{35}Ca) 2012Sh21

$J^{\pi}=0^{+}$ for ^{36}Ca ground state.

2012Sh21: A secondary beam ^{36}Ca was produced via the projectile fragmentation of a 140-MeV/nucleon ^{40}Ca primary beam impinging on a ^{9}Be target at the coupled cyclotron facility at NSCL, MSU. The ^{36}Ca nuclei were selected using the A1900 separator with a purity of 8%. The ground states of ^{35}K and ^{35}Ca were populated by the one-proton/neutron knockout reactions, respectively, from the ^{36}Ca beam at a midtarget energy of ≈70 MeV/nucleon on a 188-mg/cm^{2} ^{9}Be secondary target. Knockout residues were identified from their energy loss measured by an ionization chamber at the focal plane of the S800 spectrometer and from their ToF measured between two scintillators at the object position and at the focal plane of the S800 spectrometer. The CsI(Na) γ-ray spectrometer CAESAR was placed around the Be target position of the S800 to search decay γ of any excited states of the residuals formed in knockout reactions. Measured knockout cross sections for producing ^{35}K and ^{35}Ca from ^{36}Ca and the longitudinal momentum distribution of residuals. Deduced J, π, orbital angular momenta of the nucleons removed from ^{36}Ca, and spectroscopic factors. Calculated single-particle cross sections (σ_{sp}) for proton removal and longitudinal momentum distributions using eikonal models.

^{35}Ca Levels

E(level)	J^{π}	L	S†	Comments
0.0	1/2^{+}	0	0.23 *2*	σ_{exp}=5.03 mb *46*; σ_{sp}=11.1 mb from eikonal/Hartree-Fock model; σ_{sp}=10.2 mb from eikonal/Strong Absorption model; σ_{sp}=10.3 mb from transfer-to-continuum model. J^{π}: knockout from neutron 2s$_{1/2}$ orbital. L: deduced by comparing the experimental and calculated longitudinal momentum distributions of residuals. S: uncertainties only include experimental contributions. S: 0.23 *2* from eikonal/Hartree−Fock model; (2j+1)S=0.45; R$_{s}$=0.24 *2*. S: 0.24 *2* from eikonal/Strong Absorption model; (2j+1)S=0.49; R$_{s}$=0.26 *2*. S: 0.25 *2* from transfer−to−continuum model; (2j+1)S=0.49; R$_{s}$=0.26 *2*. S: (2j+1)S=1.80 from shell model.

† spectroscopic factor (2j+1)S=σ_{exp}/σ_{sp}.