QUADRUPOLE COLLECTIVITY MEASUREMENTS IN EVEN-EVEN, NEUTRON-RICH SILICON AND SULFUR ISOTOPES APPROACHING $N = 28$

By

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ABSTRACT

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An inelastic proton scattering experiment was performed at the National Superconducting Cyclotron Laboratory to study quadrupole collectivity in the even-even silicon and sulfur isotopes near $N = 28$. Experiments on neutron-rich sulfur isotopes have found significant collectivity and have been interpreted as pointing to the collapse of the $N = 28$ shell gap. Narrowing of a proton subshell gap in the sulfur isotopes may, however, be responsible for the increased collectivity. This experiment gives a quantitative measurement of the decrease in collectivity between ^{42}S and ^{44}S showing that the $N = 28$ shell gap does not vanish at $Z = 16$. In the silicon isotopes, the large, stable $Z = 14$ subshell gap directly ties collective trends to the strength of the $N = 28$ shell closure. Quadrupole collectivity and 2_1^+ excitation energies in the isotopes ^{36,38,40}Si give clear evidence for the narrowing of the $N = 28$ shell gap in the absence of strong proton collectivity.

to my wife Bethany

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