Proton - Neutron Interactions and The New Atomic Masses  
R.B. CAKIRLI, Yale University, Istanbul University,  
R.F. CASTEN, Yale University,  
D.S. BRENNER, Clark University,  
E.A. MILLMAN, Yale University — Proton - neutron interactions determine structural evolution with N and Z including the onset of collectivity, deformation, and phase transitions. We have extracted the interaction of the last proton and the last neutron, called $\delta V_{pn}$, from a specific double difference of binding energies using the new mass tabulation \cite{1}. Striking variations are seen near closed shells. In the Pb region, these are interpreted using overlaps of shell model orbits, which are large when both protons and neutrons are in similar orbits, and small when they are not. Further, we used the idea that shell filling follows a typical systematic pattern to look at the correlation of $\delta V_{pn}$ values to the fractions of the proton and neutron shells that are filled. These results provide useful signatures of structure in exotic nuclei.  

This work was supported by US DOE Grant Nos. DE-FG02-91ER40609 and DE-FG02-88ER-40417.  


R.B. Cakirli  
Yale University, Istanbul University  

Date submitted: 12 Jan 2005  
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