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## Systematic Evaluation of the Nuclear Binding Energies in the Valence Shells

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## Abstract

A smooth dependance of the microscopic component of the nuclear binding energy on the third projection of the F-spin and the proton number is obtained by an application of a generalized Sp(4, R) classification scheme of even-even nuclei within the major nuclear shells [1]. The results are compared with the ones from a systematic of nuclear masses [2] in respect to the promiscuity factor (P) and the relation of the later and the F-spin projection is established, which further motivates the obtained empirical result.

The obtained relation allows for the overall fit to the experimental results from [3] of 135 coefficients to reproduce 2317 nuclear masses with standard deviations on the order of 350keV, within 15 shell zones, where the established sub-shell closures are taken into account. The predictive power of the new approach is discussed and predictions of masses which are presently unmeasured, or which have considerable experimental uncertainties are presented.

## References

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