

# New islands of stability in the drip-line regions manifesting new phenomena

S.K. Patra and L. Satpathy

*Institute of Physics, Bhubaneswar-751 005*

## Abstract

Presently, the structure of nuclei away from the  $\beta$ -stability line is an important topic in Nuclear Physics, because of their interesting structure and behaviour [1]. The existence of neutron-halo in  $^{11}\text{Li}$  and the new magic numbers near the neutron drip-line in the low mass region is well discussed, both experimentally and theoretically. Near the extremely neutron-rich nuclei in the heavy mass region, because of the large neutron to proton ratio the nuclear interaction is expected to exhibit unusual phenomena not found in the nuclei in the valley of stability [2]. In some of the region of the nuclear chart, it so happens that for some specific combination of proton and neutron numbers, the nuclei become magic.

Here, the infinite nuclear matter mass model and the relativistic mean field theory show a strong evidence of new neutron magic numbers 100, 150, 164; proton magic number 78 and new islands of stability around  $N = 100$ ,  $Z$  sime 62;  $N = 150$ ,  $Z = 78$  and  $N = 164$ ,  $Z$  sime 90 in the drip-line regions of nuclear chart. It is shown that the shell effect stabilizes the instability due to the repulsive component of the nuclear force giving rise to a new phenomenon, complementary to the phenomena of fission isomer and superheavy elements where repulsive Coulomb instability is overcome by the same. While the latter elongates the stability peninsula, the former will broaden the same.

## References

- [1] I. Tanihata, J. Phys. **G22** (1996) 157.
- [2] L. Satpaty and S.K. Patra, J. Phys. **G30** (2004) 771; L. Satpathy and S.K. Patra, Nucl. Phys. **A722** (2003) 24c..