HEP ACTIVITIES
At
BERHAMPUR UNIVERSITY

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Broad Areas of Research....

- Higher Dimensional Gauge models and low-energy phenomenology (S.Mishra)
- Hadronic phenomena :Mass spectra of mesons, baryons, radiative decays, leptonic decays (S.S.Panda).
- Study of Neutrinoless double beta decay using Deformed Shell Model (R.Sahu)

Higher Dimensional Gauge models and Low-energy phenomenology

- D=6: $M^4 \times T^2$ space (T^2 as 2D Torus with radii R_1 and R_2) coupled with supersymmetric E_6 GUT predicting light Dirac neutrino of the order of 10^{-2} ev.

- D=10 : Supersymmetric E_8 group with compact six dimensional coset space $G_2/SU(3)$.

- Spontaneous compactification gives low L–R symmetry breaking scale M_R of the order of $10^4 - 10^9$ GeV, $\sin^2\theta_W$ (~0.2311), light left handed neutrino predicted through the double seesaw mechanism, SUCCESSFUL LEPTOGENESIS.

- High unification scale helps to avoid the problem of Higgsino mediated proton decay.

- S. Mishra, S. Mohanty, Int. Journal of Theo. Phys, Group Theory,Vol.12,(2008) 251–258, S.Mishra, S. Mohanty, Journal of Applied Physics ,Volume7(2015) 30.

Hadronic phenomena

▶ Through effective quark interaction potentials study of :

❖ Mass spectra of baryons ,mesons [1]

❖ Radiative decays [2],

❖ Leptonic decays of vector mesons [3]

❖ Generalised to study W-boson decay $(W^- \rightarrow e^- + \bar{\nu}_e)$ width, the branching ratio of the W- meson to the hadronic final states, neutrino scattering cross-section.

▶ 1) Baryon Mass spectra:S.N.Jena , S.Panda and T.C.Tripathy Phy.RevD 63014011(2011)

▶ 2) Radiative Decays:S.N.Jena, S.Panda and T.C.Tripathy Nuclear Physics A 49 5(2012)

▶ 3)Study of weak leptonic decays of pdeudo scalar mesons:S.panda etal IJMPA 30150092(2015)

Study of Neutrinoless double beta decay

- Calculation of nuclear matrix elements (NTME) in the Deformed Shell Model [1]
- The 2νββ decay of ^{76}Ge, ^{74}Se, ^{82}Se, ^{84}Sr, ^{78}Kr in good agreement with the experimentally measured half-life of 2νββ [2].
- Neutrinoless double beta decay of ^{70}Zn, ^{80}Se and ^{82}Se nuclei [3]

- [1] Deformed shell model and spin-isospin interacting boson model, V.K.B. Kota and R. Sahu, CRC Press, Taylor & Francis Group, Florida, USA.
- [2] S. Mishra, A. Shukla, R. Sahu and V. K. B. Kota, Phys. Rev. C 78 (2008) 024307
- [3] R. Sahu, P. C. Srivastava and V. K. B. Kota, J. Phys. G 40 (2013) 095107.

THANK YOU