ADVANCES IN THE LIE-SANTILLI ISOTHEORY

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Let L be an n-dimensional Lie algebra over a field F of characteristics zero with Hermitean generators X_k, $k = 1, 2, ..., n$, universal enveloping associative algebra $\xi(L)$, $L \approx [\xi(l)]^-$ with associative product $X_i \times X_j$, Lie algebra $[X_i, X_j] = X_i \times X_j - X_j \times X_i = C_{ij}^k \times X_k$, and Lie transformation groups. R. M. Santilli proposed in 1978 [1] (see also [2.3]) the axiom-preserving lifting, called isotopy, of the various branches of Lie's theory with: isoassociative product $X_i \hat{\times} X_j = X_i \times \hat{T} \times X_j$ where $\hat{T}$ (called the isotopic element) is a fixed positive-definite operator with a functional dependence on local variables; isoenveloping algebra $\hat{\xi}(\hat{L})$ characterizing the Lie-Santilli isoalgebras $\hat{L} \approx [\hat{\xi}(\hat{L})]^-$ with isocommutation rules $[X_i \hat{,} X_j] = X_i \hat{\times} X_j - X_j \hat{\times} X_i = \hat{C}_{ij}^k \hat{\times} X_k$; and Lie-Santilli isogroups. When the C's are constant (as for the conventional Lie theory), we have the *Regular Lie-Santilli IsoTheory,* and when the C's are functions of the local variables (solely possible for the covering IsoTheory) we have the *Irregular Lie-Santilli IsoTheory.* In this lecture, we review the Lie-Santilli IsoTheory defined, for consistency, on Santilli IsoFiels $\hat{F}$ [4] with multiplicative isounit $\hat{I} = 1/\hat{T} > 0$ and formulated via Santilli's Isodifferential calculus [5]. We then review that the regular isotheory can be obtained via non-unitary transforms of the conventional theory; we show that the Irregular Lie-Santilli IsoTheory cannot be obtained via maps of the conventional theory, thus constituting a bona-fine new theory; and we present advances in the regular and irregular isorepresentation theory and its application to the notion of regular and irregular isoparticle.

References

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