

## IsoAction Principle

$$\hat{\delta}\hat{\mathbf{A}} = \hat{\delta} \int_{t_1}^{t_2} (\hat{\mathbf{p}}_k \hat{\times} \hat{\mathbf{d}}\hat{\mathbf{r}}^k - \hat{\mathbf{H}} \hat{\times} \hat{\mathbf{d}}\hat{\mathbf{t}}) = \hat{\delta} \int_{t_1}^{t_2} [\mathbf{p}_k \times \hat{\mathbf{T}}_i^k(\mathbf{t}, \mathbf{r}, \mathbf{p}, \dots) \times \hat{\mathbf{d}}\hat{\mathbf{r}}^i - \hat{\mathbf{H}} \times \hat{\mathbf{T}}_{\hat{\mathbf{t}}} \times \hat{\mathbf{d}}\hat{\mathbf{t}}] = 0$$

## Lagrange-Santilli IsoEquations

$$\frac{\mathbf{d}}{\hat{\mathbf{d}}\hat{\mathbf{t}}} \frac{\partial \hat{\mathbf{L}}(\hat{\mathbf{t}}, \hat{\mathbf{r}}, \hat{\mathbf{v}})}{\partial \hat{\mathbf{v}}_k} - \frac{\partial \hat{\mathbf{L}}(\hat{\mathbf{t}}, \hat{\mathbf{r}}, \hat{\mathbf{v}})}{\partial \hat{\mathbf{r}}_k} = 0$$

## Hamilton-Santilli IsoEquations

$$\frac{\hat{\mathbf{d}}\hat{\mathbf{r}}^k}{\hat{\mathbf{d}}\hat{\mathbf{t}}} = \frac{\partial \hat{\mathbf{H}}}{\partial \hat{\mathbf{p}}_k}, \quad \frac{\partial \hat{\mathbf{H}}}{\partial \hat{\mathbf{t}}} = -\frac{\partial \hat{\mathbf{H}}}{\partial \hat{\mathbf{r}}^k}.$$

**Consistent Lie-Santilli IsoAlgebra in the brackets of the time evolution**

$$\frac{\hat{\mathbf{d}}\hat{\mathbf{A}}}{\hat{\mathbf{d}}\hat{\mathbf{t}}} = \frac{\partial \hat{\mathbf{A}}}{\partial \hat{\mathbf{r}}} \frac{\partial \hat{\mathbf{H}}}{\partial \hat{\mathbf{p}}} - \frac{\partial \hat{\mathbf{H}}}{\partial \hat{\mathbf{r}}} \frac{\partial \hat{\mathbf{A}}}{\partial \hat{\mathbf{p}}} = [\hat{\mathbf{A}}, \hat{\mathbf{H}}]$$

## Hamilton-Jacobi-Santilli IsoEquations

$$\frac{\partial \hat{\mathbf{A}}}{\partial \hat{\mathbf{t}}} + \hat{\mathbf{H}} = 0, \quad \frac{\partial \hat{\mathbf{A}}}{\partial \hat{\mathbf{r}}^k} - \hat{\mathbf{p}}_k = 0, \quad \frac{\partial \hat{\mathbf{A}}}{\partial \hat{\mathbf{p}}_k} \equiv 0.$$

R. M. Santilli, *Elements of Hadronic Mechanics*,  
 Volumes I and II Ukraine Academy of Sciences, Kiev, 1995,  
<http://www.santilli-foundation.org/docs/Santilli-300.pdf>  
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