

## »PHYSWIKIQUIZ« ISSUES

### RIGHT-HAND SIDE SUBSTITUTIONS

- Centripetal acceleration:  $a_C = \frac{v^2}{r}$   
→ The index  $a_C$  is not supported.
- Conservation of energy:  
 $E_{\text{tot},1} = E_{\text{tot},2}$   
→ The indices  $_{\text{tot},x}$  are not supported.
- Dirac equation in curved spacetime:  $i\gamma^a e_a^\mu D_\mu \Psi - m \Psi = 0$   
→ The formula right-hand side (rhs) already set zero, the left-hand side (lhs) is not a single identifier.
- Elastic energy:  $U = \frac{1}{2} k \Delta x^2$  with identifier properties  
[('spring constant', 'k'), ('linear strain', '\Delta x'), ('elastic energy', 'U')]  
→ The identifiers are in wrong order, 'spring constant' k is interpreted as lhs.
- Energy-momentum relation:  $E^2 = p^2 c^2 + m^2 c^4 \rightarrow c^4 m^2 + c^2 p^2 \rightarrow 62426$   
→ Very large number, lhs is identifier squared.
- Escape velocity:  $v_{\text{esc}} = \sqrt{\frac{2GM}{r}} = \sqrt{2gr}$   
→ Two equation signs = occur.
- Euler-Lagrange equation:  
 $\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{q}_j} \right) = \frac{\partial L}{\partial q_j}$   
→ The lhs is a complex expression.
- Force:  $F = \frac{dp}{dt}$   
→ Identifier properties and formula are not matching.
- Four-momentum:  $p^\mu = \begin{matrix} \end{matrix}$ ...  
→ Matrix cannot be calculated, formula too general depending on index dimension.
- Galilean transformation:  
 $(t, \mathbf{x}) \mapsto (t+s, \mathbf{R}\mathbf{x} + \mathbf{vt} + \mathbf{y})$   
→ The operator 'mapsto' is not supported, two variable transformation.
- Generalized momentum:  $p_i = \frac{\partial L}{\partial \dot{q}_i}$   
→ The  $\dot{}$  derivative is not supported.
- Hamiltonian operator:  $H \left( q, p, t \right) = p \cdot \dot{q} - L \left( q, \dot{q}, t \right)$   
→ Function arguments like () or \left are not supported.
- Rest mass:  $E_{\text{total}} \rightarrow \{E, t, o, t, a, l\}$   
→ Translation of index letters into identifiers.
- Tangential velocity:  $v = \omega r$   
→ Identifier  $\omega$  is v in identifier properties list.
- Work:  $A = \int_{\Gamma} F \cdot dr$   
→ Integral semantic index used instead of boundaries (interpreted as lower limit with upper missing).

### EXPLANATION TEXT GENERATION

- Energy-momentum relation: Solution from [www.wikidata.org/wiki/Q103439852](http://www.wikidata.org/wiki/Q103439852) formula  $E^2 = p^2 c^2 + m^2 c^4$   
with  $10100 \text{ m}^2 \text{ kg s}^{-2} = 2 \text{ m kg s}^{-1}^2 + 4 \text{ kg}^2 \text{ m s}^{-1}^4$ .  
→ Implicit multiplication operators, square power operator brackets missing.
- Hooke's law: Solution from [www.wikidata.org/wiki/Q170282](http://www.wikidata.org/wiki/Q170282) formula  $F = k X$   
with  $40 \text{ m kg s}^{-2} = 4 \text{ kg s}^{-2} 10 1$ .  
→ Unit of dimensionless identifier X set to 1.
- Mass-energy equivalence: Solution from [www.wikidata.org/wiki/Q35875](http://www.wikidata.org/wiki/Q35875) formula  $e = m c^2$   
with  $e = 1 \text{ kg } 10 \text{ m s}^{-1}^2$ .  
→ Rhs value missing, square power operator brackets missing.
- Mechanical impedance: Solution from [www.wikidata.org/wiki/Q6421317](http://www.wikidata.org/wiki/Q6421317) formula  $Z_m = Z_a A^2$   
with  $Z_m = Z_a 8 \text{ m}^2$ .  
→ Identifiers with indices not evaluated.
- Moment of inertia: Solution from [www.wikidata.org/wiki/Q165618](http://www.wikidata.org/wiki/Q165618) formula  $J_Q = \int r_Q^2 dm$   
with  $J_Q = \int r_Q^2 d 7 \text{ kg}$ .  
→ Rhs and integral not evaluated.