Re: Symmetric language

Source: http://sci.tech−archive.net/Archive/sci.physics/2005−08/msg02789.html

- *From*: Uncle Al <UncleAl0@xxxxxxxxxxxx>
- *Date*: Fri, 19 Aug 2005 11:31:39 −0700

Edward Green wrote:
>
> Some characterisitic language used in the description of symmetries
> existing or lacking in physical law seems to be rather misleading. For
> example:
>
> "The essence of Charge Parity (CP) is the concept of
> symmetry. Both C and P are symmetries that are
> conserved in most particle interactions."
>
> "C represents swapping the electric charges of all the
> sub−atomic particles in an interaction; in other words,
> swapping particles and antiparticles. P is called parity
> and it corresponds to looking in a mirror that reverses
> all three spatial co−ordinates."
>
> http://news.bbc.co.uk/1/hi/sci/tech/1330190.stm
>
> The symmetries are said to be "conserved", but the conservation of a
> physical quantity is not implied; there is no conserved physical
> quantity called "parity".

Oh yes there is! Your ignorance does not influence reality's
content.

http://physics.nist.gov/GenInt/Parity/cover.html

http://pdg.lbl.gov/2005/tables/contents_tables.html
"TESTS OF CONSERVATION LAWS"

Metric theories of gravitation wth tensors are parity−symmetric.
[(+/−)x,(+/−)y,(+/−)z) and [(−/+)x,(−/+)y,(−/+)z] give identical
answers (also, Newtonian gravitation and Green's function).
Affine−teleparallel theories of gravitation with pseudotensors can be
parity−antisymmetric. [(+/−)x,(+/−)y,(+/−)z) and
[(−/+)x,(−/+)y,(−/+)z] can give different answers.

The disjoint overlap of metric and affine gravitation is the only
apparent way remaining to empirically falsify General Relativity. It

allows all prior physical observations to remain unmolested while falsifying the mathematical structure of General Relativity and validating the mathematical structure of affine−teleparallel gravitation.

http://www.physics.indiana.edu/~kostelec/faq.html

> It so happens electric charge _is_ a
> conserved quantity, but this merely adds to the confusion. What is
> meant is that physical law is either invariant in form, or not, under
> the reversal of charge or coordinates.

Local symmetries create conservation laws through Noether's theorem. A conserved quantity derives from each symmetry commuting with time, and the reverse. A divergence−free current (conserved property) arises if the Lagrangian or the action is invariant under continuous transformation.

1) To each continuous symmetry of an action there corresponds a conserved quantity because of the Euler−Lagrange equations of the Lagrangian, and the reverse.
2) To each gauge symmetry of an action there corresponds an identity among Euler−Lagrange equations of the Lagrangian, and the reverse.

A physical system with a Lagrangian invariant with respect to the symmetry transformations of a Lie group has, in the case of a group with a finite (or countably infinite) number of independent infinitesimal generators, a conservation law for each such generator, and certain "dependencies" in the case of a larger infinite number of generators (General Relativity and the Bianchi identities). The reverse is true.

A symmetry can be broken explicitly − a term in the action or equations of motion may not be invariant. A symmetry can be broken anomalously − not all classical theory symmetries exist in the corresponding quantum theory. Quantum field theory anomaly spoils renormalizability. Anomaly absence in the Standard Model is crucial. A symmetry can be broken spontaneously if it is an exact symmetry of the equations of motion but not of a particular solution therein.
Noether's theorem holds if the symmetry is not broken explicitly.
Conservations can be relaxed in subsystems displaying reduced symmetry (Born scattering approximation, Fermi's golden rule, Snell's law).

PARITY is unique for not being a Noetherian symmetry. Inversion of all coordinates is a discrete process that cannot be approximated by a Taylor series. Parity the symmetry is linked to parity the property by other strong correspondences. Parity is conserved by strong interactions but commonly violated by weak interactions (including the Weak Interaction). As gravitation is the weakest known force, one might optimistically expect a metric (parity−conserving) vs. affine

(parity−violating) gravitation anomaly.

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Uncle Al
http://www.mazepath.com/uncleal/
(Toxic URL! Unsafe for children and most mammals)
http://www.mazepath.com/uncleal/qz.pdf
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- ***Follow−Ups***:
  - ♦ ***Re: Symmetric language***
    - ◊ *From:* Ken S. Tucker
  - ♦ ***Re: Symmetric language***
    - ◊ *From:* Edward Green

- ***References***:
  - ♦ ***Symmetric language***
    - ◊ *From:* Edward Green

- Prev by Date: ***Re: Nanotubes make perfect diodes***
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