The macro column is off to a good start. Readers are commenting on published macros as well as sending in descriptions of problems they have encountered. However, no one has yet submitted solutions to posed questions ...
Preamble

The bubble notation used in particle physics is identical in format with a notation for tensors due to the relativist Roger Penrose. This "language" is strictly formalised, with the possible diagrams governed by a few simple rules. In effect, a diagram consists of a number of "boxes", joined together by lines. A \texttt{TeX} extension is proposed, in which Penrose or bubble diagrams can be displayed in exactly the same way as mathematical formulae.

Analysis of the notation

There are 2 elements in the diagrams.

First, there are the tensors or bubbles. Each consists of a "container" of some kind, usually a rectangle or a circle. Inside there may be an identifying name or symbol.

Emerging from the perimeters of these containers are the second element of the diagrams, the arms. An arm may join 2 tensors; or it may extend to the edge of the diagram.

The relative positions of the arms on a tensor is significant, e.g. if the tensor \( T \) is represented by a rectangle, with 2 upper arms and 1 lower, then the left upper arm must be distinguished from the right upper arm; and both are quite different from the lower arm.

(If only that sought-for \texttt{TeX}pert could tell me how to replace this pedantic description of a box by a magical control sequence . . . !)

Meaning of the Penrose notation

Although not strictly necessary, it may help if I explain, very briefly, the interpretation of the Penrose notation for tensors.

In the classical (Einstein) notation, a tensor of type \((1,2)\) (for example) is denoted by

\[ T^i_{jk} \]

Here \( i, j \) and \( k \) are "dummy suffixes", so that each

\[ T^a_{bc} \]

represents exactly the same tensor.

In the Penrose notation, \( T \) is incarcerated in a box, with 1 upper arm (corresponding to the upper index \( i \)) rising from the top of the box, and 2 lower arms (corresponding to the lower indices \( j \) and \( k \)) descending from the bottom of the box.

The joining of arms on 2 tensors (or on the same tensor) in a Penrose diagram corresponds to the contraction of the corresponding indices—denoted