



CZYTAMY PO ANGIELSKU

Broken Symmetry

Gorąco polecamy lekturę *The Physics Teacher*. W grudniowym numerze (Vol. 38, 2000), Martin Gardner przedstawia w rubryce „Physics Trick of the Month” artykuł o złamanej symetrii.

Broken symmetry is a key concept in modern cosmology. Immediately after the big bang, matter was in a highly symmetrical and extremely hot state. As the universe cooled, various symmetries were broken to form the cool universe we know and love.

Here is a dramatic way to model broken symmetry. Start by balancing the cards of a deck on their edges to form the structure shown in Fig. 1. You have to be very careful and patient through this process, and the assistance of a friend can be helpful. (Using 25 or so 3.5-in computer diskettes may be easier). The completed structure has what mathematicians call radial symmetry, like the symmetry of a right circular cylinder. It is mirror symmetric, identical with its mirror image.

Bang your fist on the table to represent the universe’s big bang. The beautiful radial symmetry is broken, and the cards collapse into the lovely rosette shown in Fig. 2. It will have left- or right-handedness, or *chirality* as physicists prefer to say. The two possible states of the rosette occur with equal probability. They model the fact that as the universe cooled, its initial symmetry broke into matter rather than antimatter of opposite chirality. Exactly how and why this happened is still controversial.

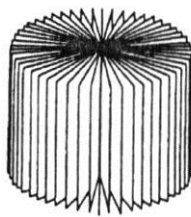


Fig. 1

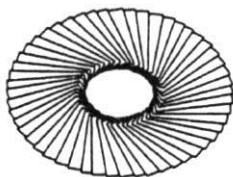


Fig. 2