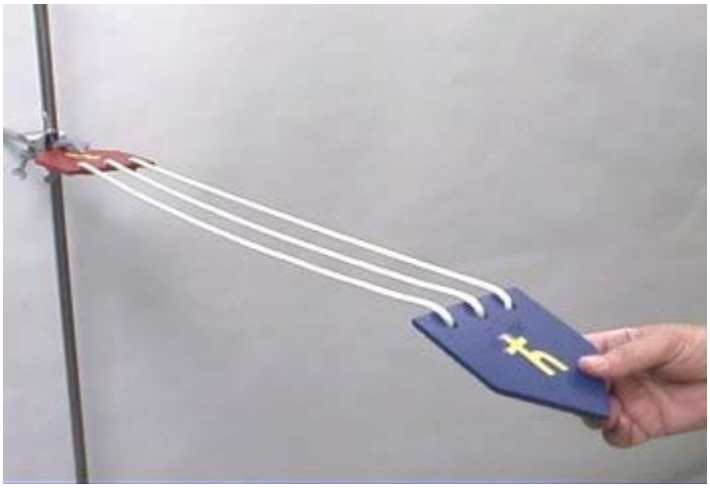
Answer #269

The answer is (d): you must rotate the nearby bracket two turns counterclockwise, as seen in an mpeg video by clicking your mouse on the photograph below.



This is a model of an idea suggested by Dirac: there exist a number of quantum mechanical transformations that cannot be undone by a **single 360^{o}** rotation, but rather require **two rotations, or 720^{o}** in order to transform the system back to its original state. This is a model of such a "transformation."

For a variation, click here.

An interesting example of another case where 360^{o} rotation is not the same as 720^{o} rotation involves rotating a plate held rigidly attached to your hand. As you rotate the plate continuously in the same direction your arm does not reach its original configuration until after two complete revolutions of the plate, 720^{o}. Click here to see one such example. Click here to see a video of Krishna performing this set of operations.

By the way, if anyone has a better or more complete description of this setup and how it models quantum mechanical transformations, or even additional helpful commentary, please let us know and we will post it here with due credit and thanks. This seems to be relatively obscure, even to nuclear physics theoreticians, although it is interesting on its own just as a wierd geometrical question.

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Question of the Week

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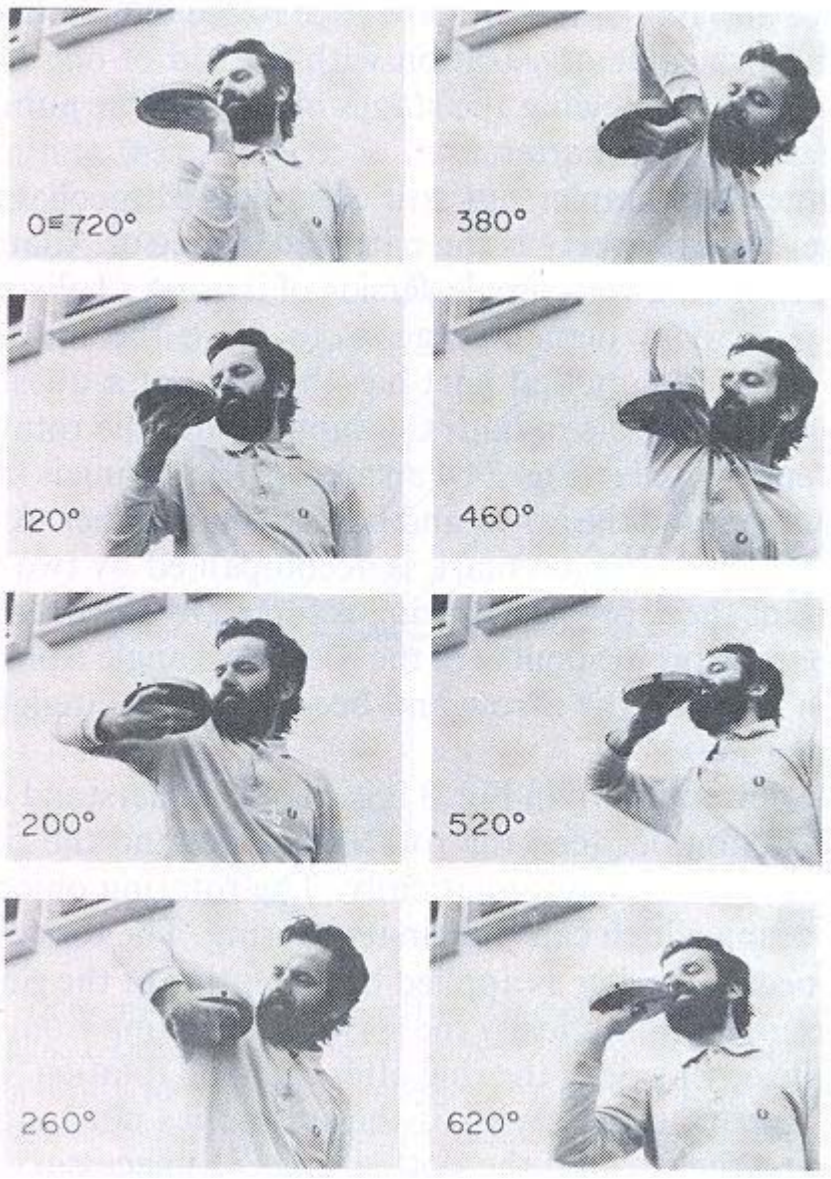
For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.

Edgar Rieflin, Some mechanisms related to Dirac's strings, American Journal of Physics Vol.47 #4, April 1979, pp. 379-381.



Everyone should actually try this. I failed miserably. It does help if you have two elbows.