

# *The Relativistic Superluminal Quantum-Vortex Electron Model*

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# Parametric equations for the spin-up relativistic superluminal quantum-vortex electron model

$$x(t) = R_o \left( \frac{1}{\gamma^2} + \frac{1}{\gamma} \cos(\gamma\omega_{zitt}t) \right) \cos(\gamma\omega_{zitt}t)$$

$$y(t) = R_o \left( \frac{1}{\gamma^2} + \frac{1}{\gamma} \cos(\gamma\omega_{zitt}t) \right) \sin(\gamma\omega_{zitt}t)$$

$$z(t) = \frac{R_o}{\gamma} \sin(\gamma\omega_{zitt}t) + vt$$

where  $R_o = \frac{\hbar}{2mc} = 1.93 \times 10^{-13} \text{ m}$

and  $\omega_{zitt} = 2mc^2 / \hbar = 1.55 \times 10^{21} \text{ radians/sec}$  is the electron's zitterbewegung angular frequency.

# Parametric equations for the spin-down relativistic superluminal quantum-vortex electron model

$$x(t) = R_o \left( \frac{1}{\gamma^2} + \frac{1}{\gamma} \cos(\gamma\omega_{zitt}t) \right) \cos(\gamma\omega_{zitt}t)$$

$$y(t) = -R_o \left( \frac{1}{\gamma^2} + \frac{1}{\gamma} \cos(\gamma\omega_{zitt}t) \right) \sin(\gamma\omega_{zitt}t)$$

$$z(t) = \frac{R_o}{\gamma} \sin(\gamma\omega_{zitt}t) + vt$$

where  $R_o = \frac{\hbar}{2mc} = 1.93 \times 10^{-13} \text{ m}$

and  $\omega_{zitt} = 2mc^2 / \hbar = 1.55 \times 10^{21} \text{ radians/sec}$  is the electron's zitterbewegung angular frequency.

# How does the size of this relativistic electron model vary with its velocity?

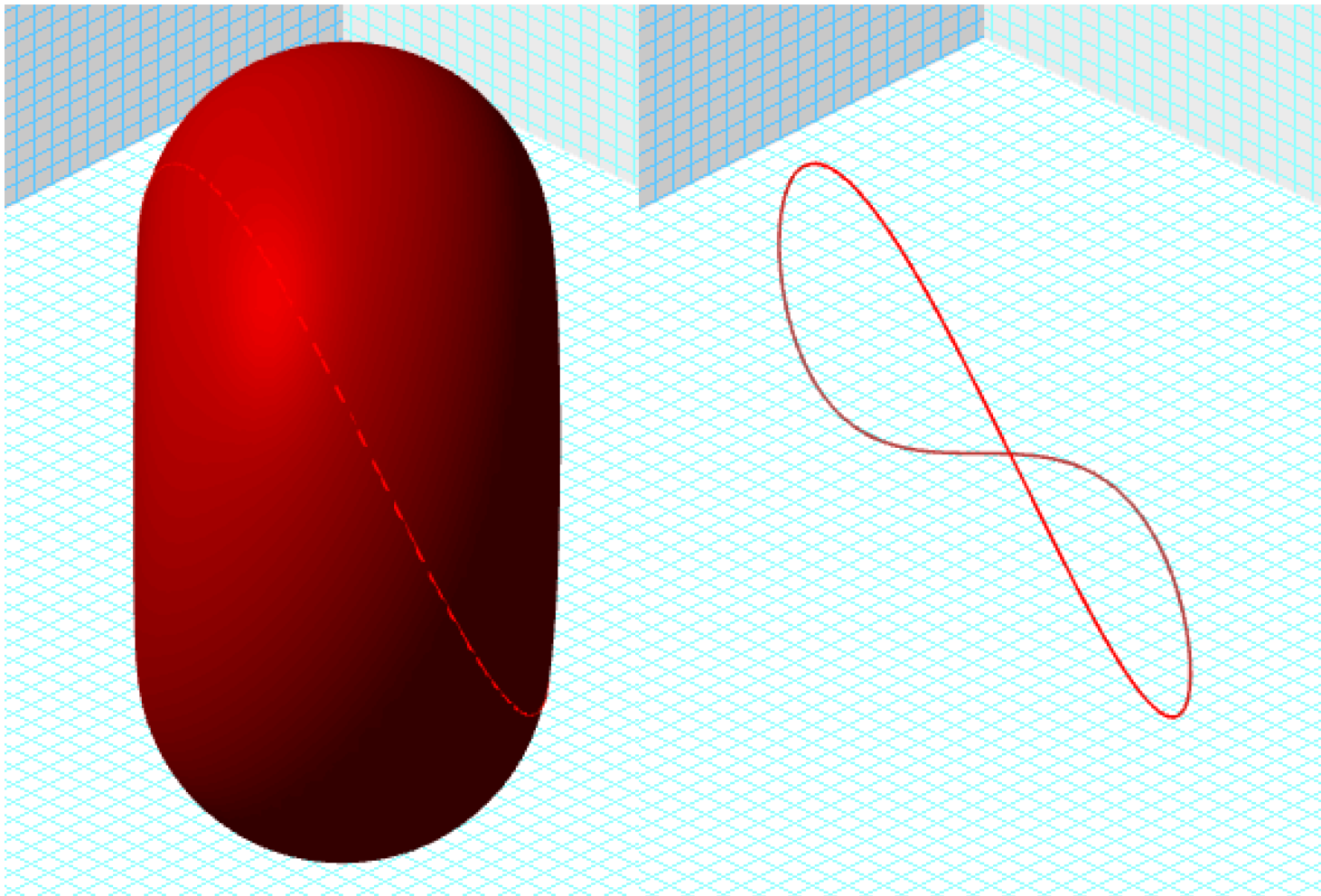
The following 3-D graphics show how the size and shape of the relativistic superluminal quantum-vortex electron model changes with its velocity  $v$ , indicated by  $\Gamma = 1/\sqrt{1-v^2/c^2}$  and  $\beta = v/c$ . In the following diagrams,  $\Gamma$  varies from 1, where  $v = 0$ , to 100, where  $v = 0.99995 c$ . The 3-D trajectory of the circulating superluminal energy quantum composing the electron model decreases in size in proportion to  $1/\Gamma$ . The mathematical surface along which the superluminal energy quantum moves, changes from a horn torus when  $v = 0$ , to a spheroidal torus as  $\Gamma$  increases towards 100 or more. When  $v = 0$ , the width of the electron model is  $h/2\pi mc = 3.86 \times 10^{-13} \text{ m}$ .

More information about this electron model is given in the article at [https://www.academia.edu/37113165/Quantum-Vortex\\_Electron\\_Formed\\_From\\_Superluminal\\_Double-Helix\\_Photon\\_in\\_Electron-Positron\\_Pair\\_Production](https://www.academia.edu/37113165/Quantum-Vortex_Electron_Formed_From_Superluminal_Double-Helix_Photon_in_Electron-Positron_Pair_Production)

and

[https://www.academia.edu/37191677/Quantum-Vortex\\_Electron\\_and\\_Positron\\_Formed\\_From\\_Superluminal\\_Double-Helix\\_Photon\\_in\\_Electron-Positron\\_Pair\\_Production -- Powerpoint](https://www.academia.edu/37191677/Quantum-Vortex_Electron_and_Positron_Formed_From_Superluminal_Double-Helix_Photon_in_Electron-Positron_Pair_Production_-_Powerpoint) .

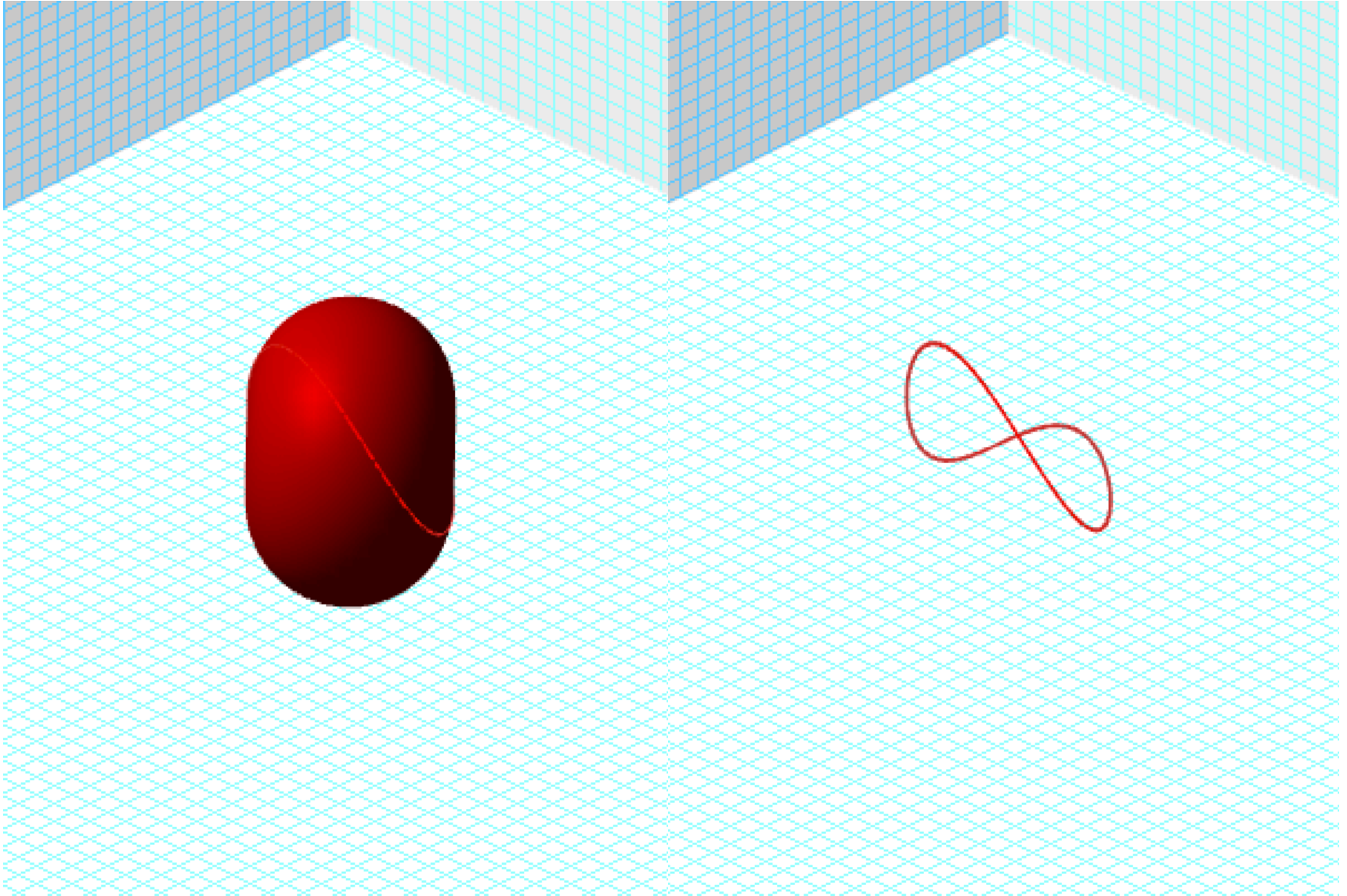
Side view. Gamma =1.0      Beta=0.0      The trajectory of the superluminal energy quantum forming the electron model lies on the surface of a horn torus and passes through its center.



The electron model is moving to the right.

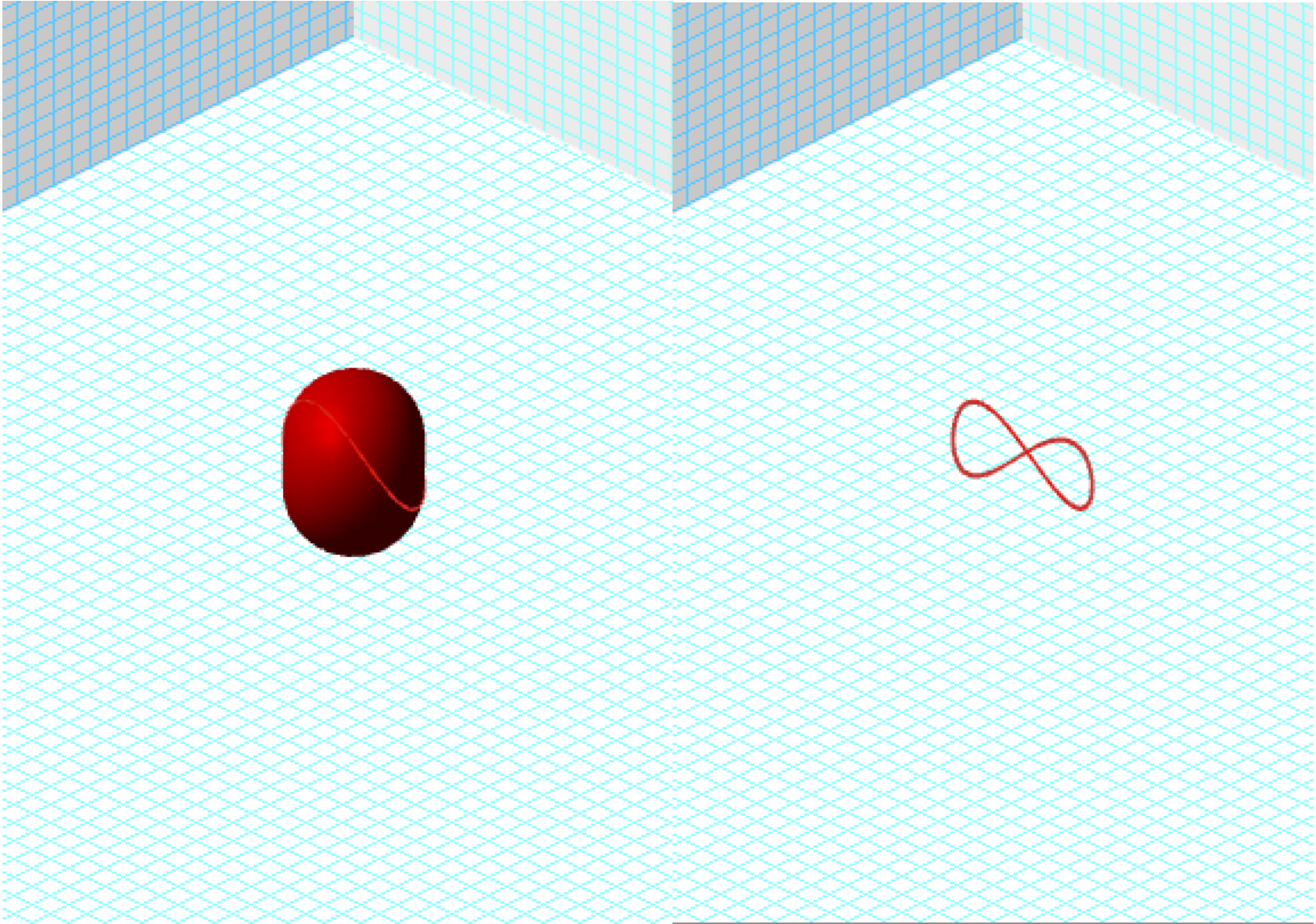
Gamma = 2.0

Beta = .866



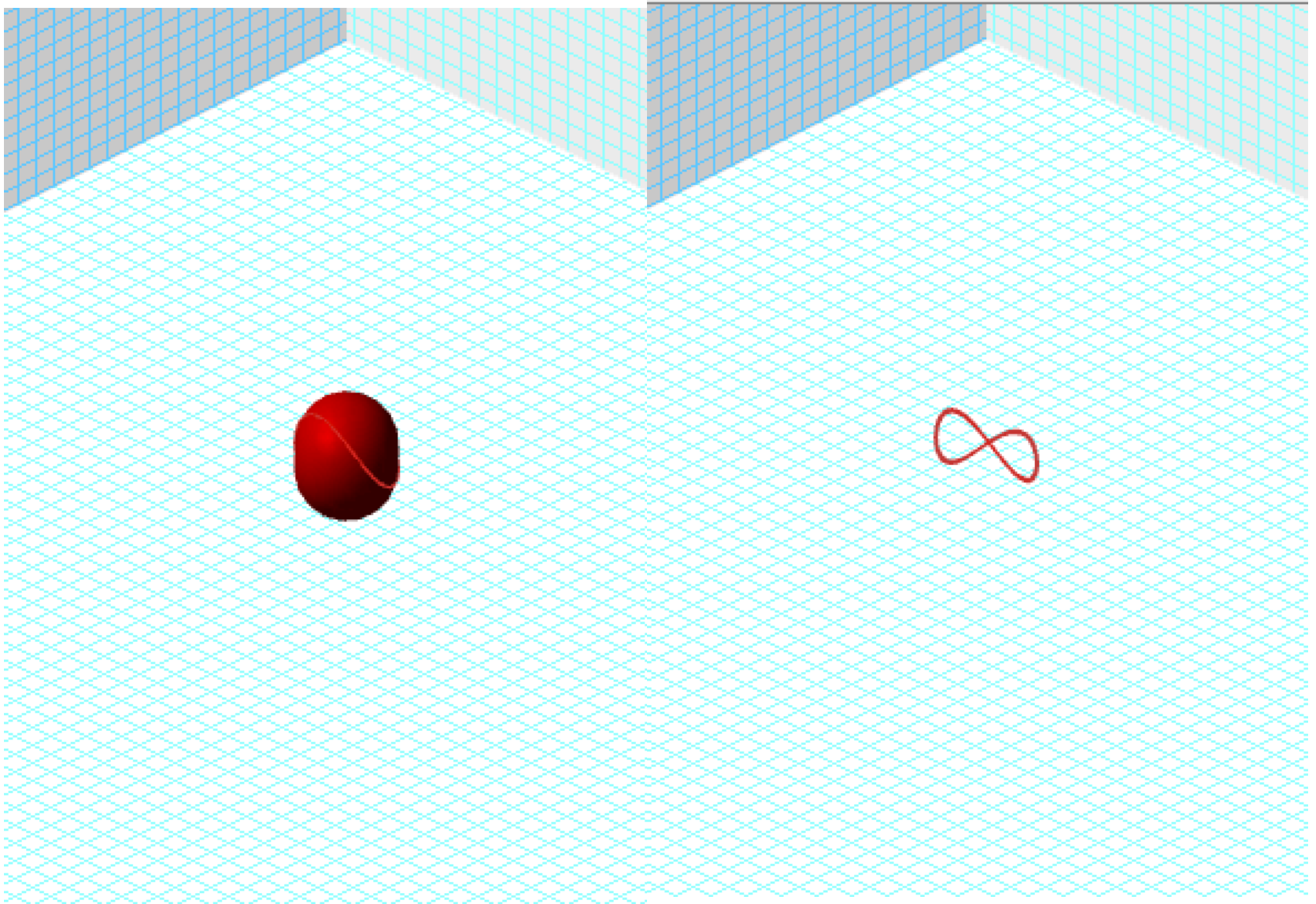
Gamma = 3.0

Beta = .943



Gamma = 4.0

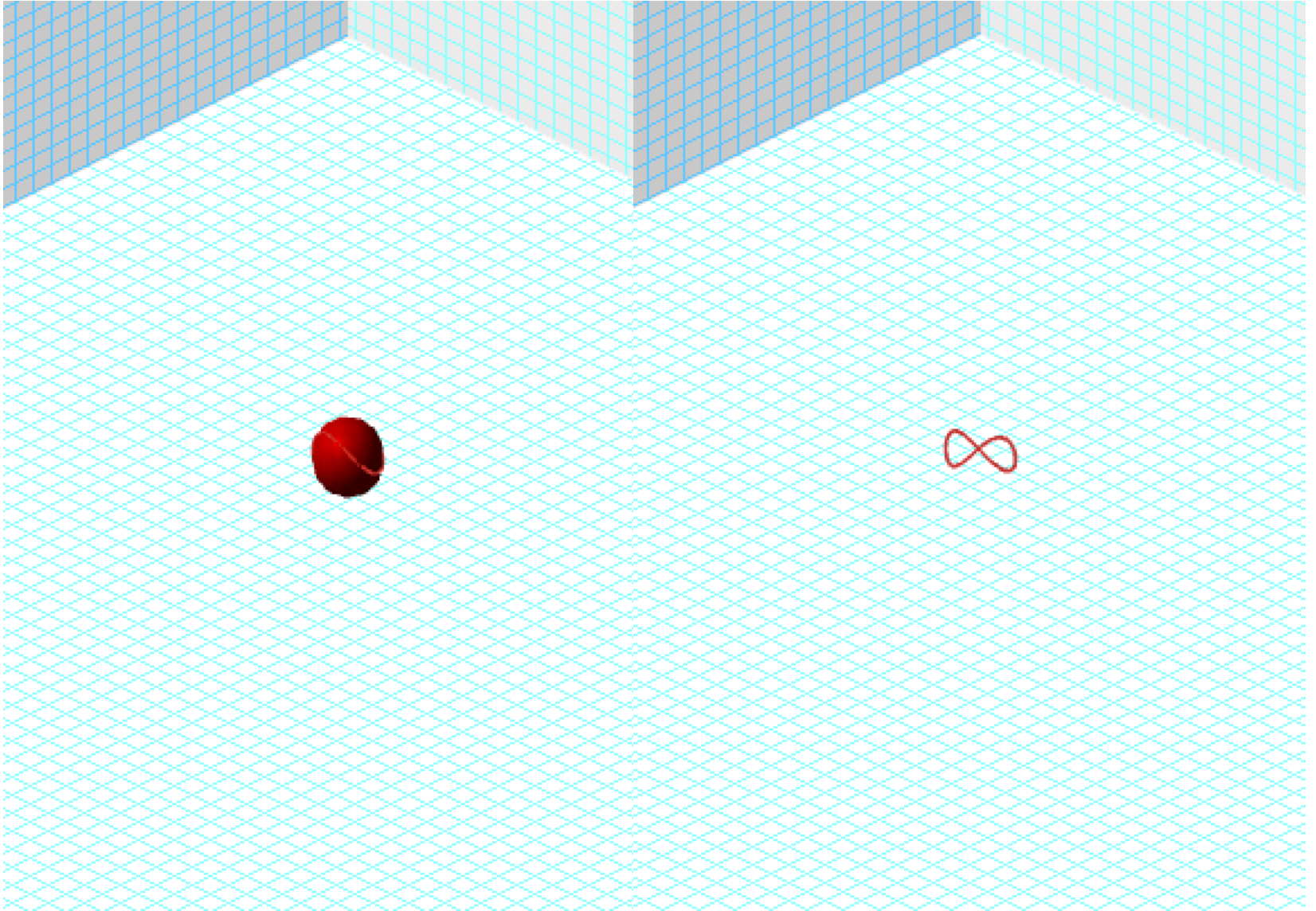
Beta = .968





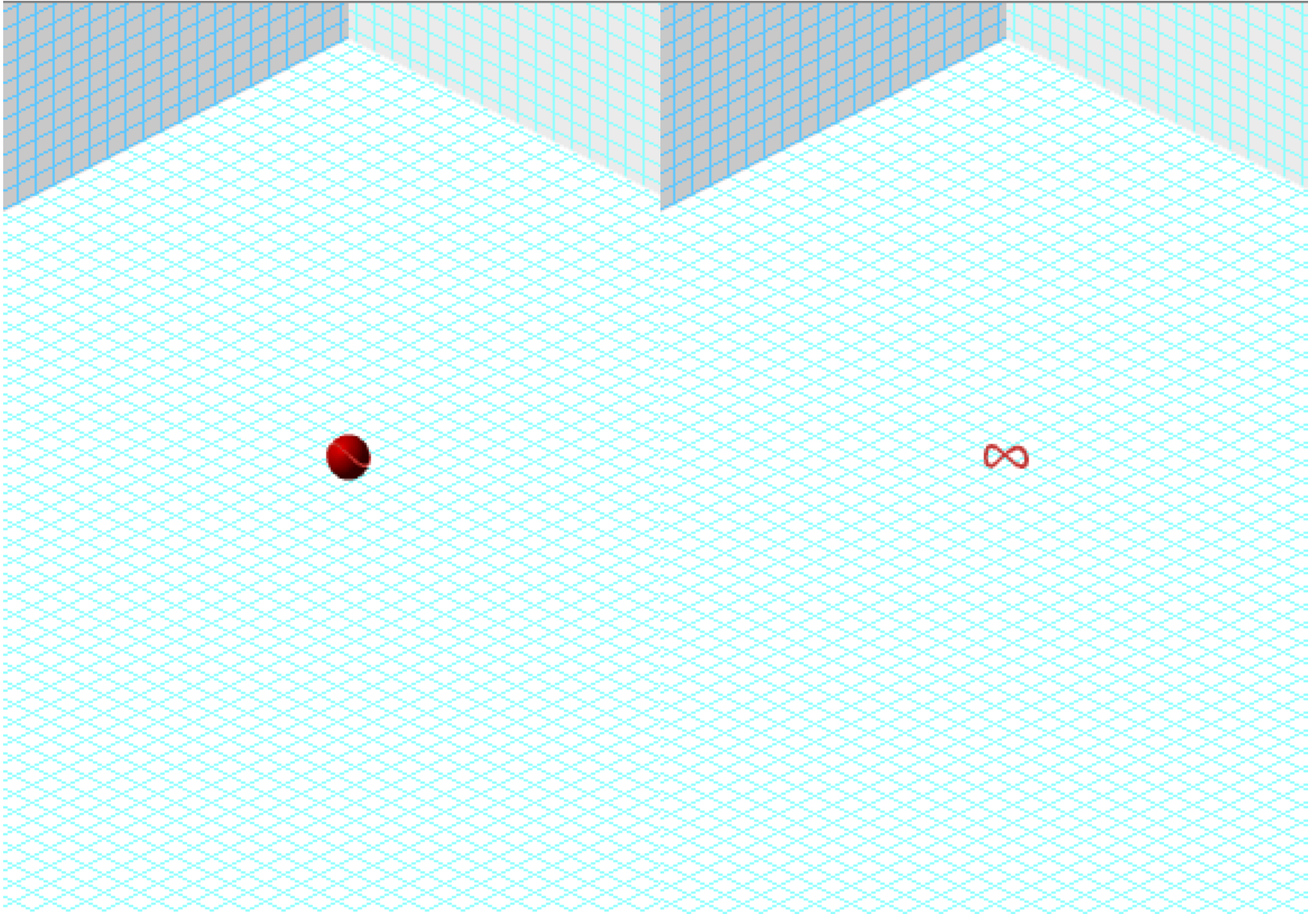
Gamma = 6.0

Beta = .986



Gamma = 10.

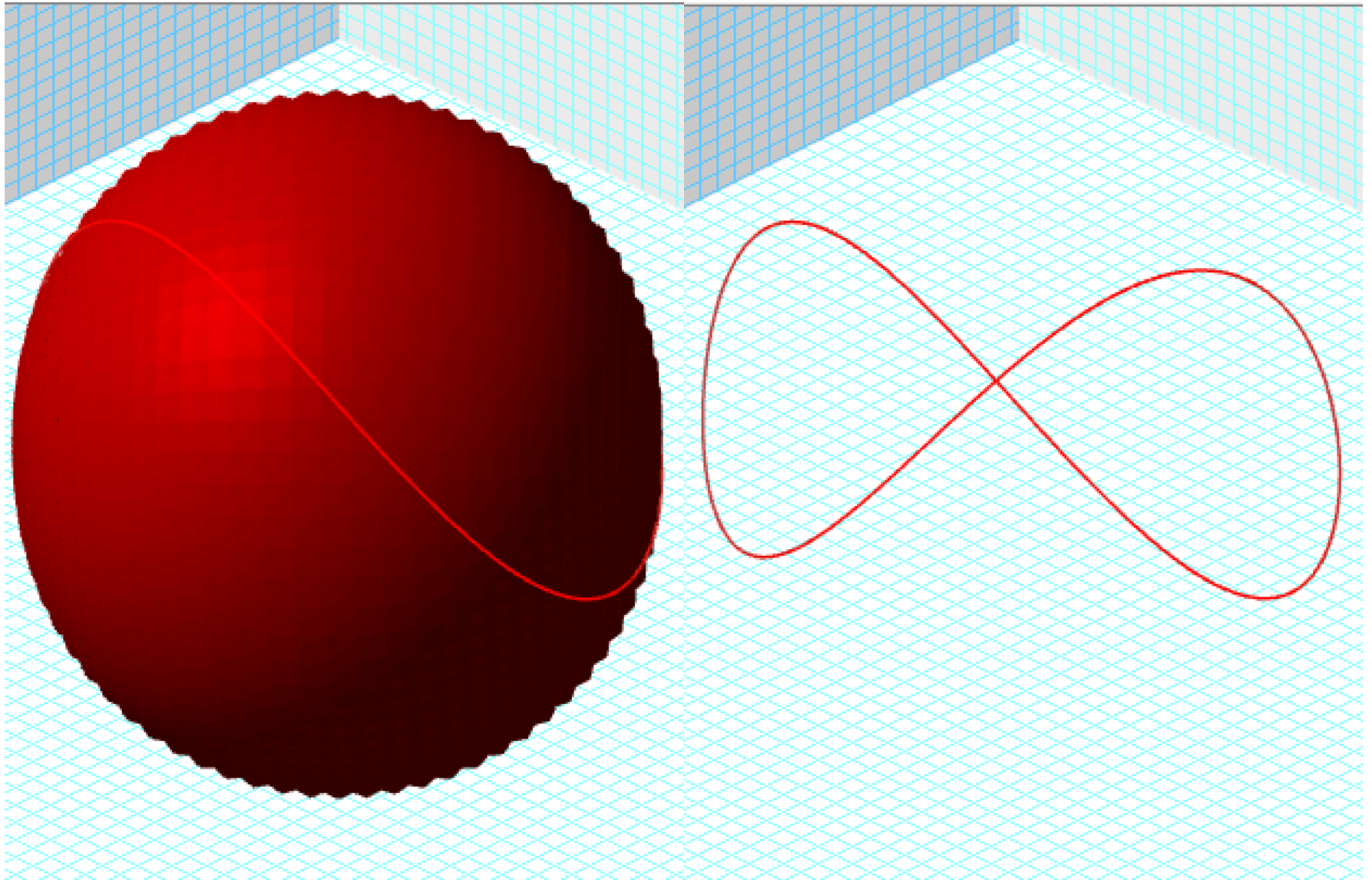
Beta = .995



Gamma = 10.

Beta = .995

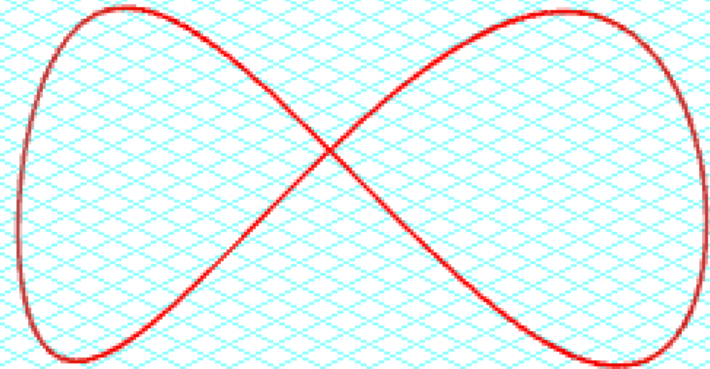
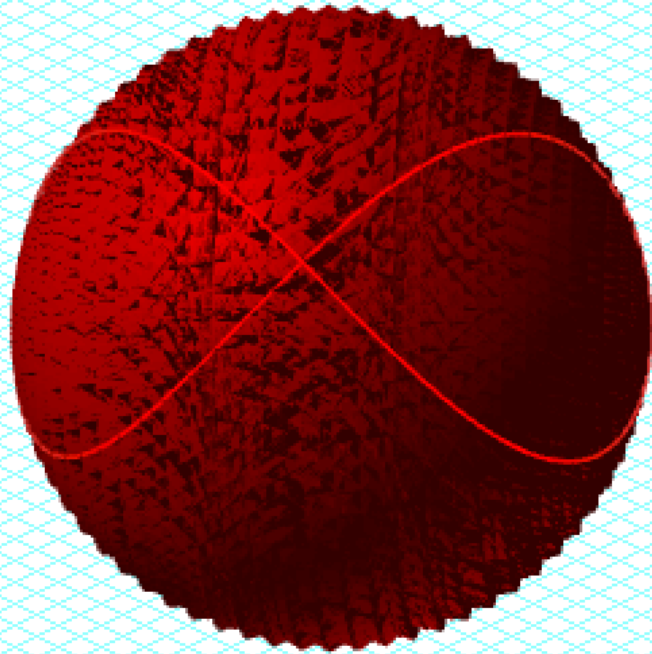
Enlarged image of previous diagram.



Gamma = 100.

Beta = .99995

Enlarged image. The trajectory of the superluminal energy quantum is on the surface of a spheroidal torus.



Gamma = 100.

Beta = .99995

Magnified. A view of the previous image from a different angle.

