ENERGY RANGE FOR QUANTUM TUNNELING SIMULATION

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In wave packet mode, if the average energy is at E_0, then the green color will be brightest at $E = E_0$ and decrease linearly in brightness to $E = E_-$ below and $E = E_+$ above. E_- and E_+ are given by:

$$E_- = E_0 - \frac{2\hbar}{\sigma}\sqrt{\frac{2(E_0 - V_0)}{m}} + \frac{2\hbar^2}{m\sigma^2} \tag{1}$$

$$E_+ = E_0 + \frac{2\hbar}{\sigma}\sqrt{\frac{2(E_0 - V_0)}{m}} + \frac{2\hbar^2}{m\sigma^2} \tag{2}$$

where V_0 is the potential energy in the region where the initial wave packet center is.

The equations above apply only if $E > V$ in the region where the initial wave packet center is. Otherwise, there is no wave packet, and no spread in energy. In this case, just make the energy a single thin line like in plane wave mode.

Note that E_- and E_+ are *not* equidistant from E_0. The energy extends further above the average energy than it does below. If it is very difficult to code it so that it doesn't fade equally in both directions, you can replace E_+ with:

$$E_+ = E_0 + \frac{2\hbar}{\sigma}\sqrt{\frac{2(E_0 - V_0)}{m}} - \frac{2\hbar^2}{m\sigma^2} \tag{3}$$

in order to make E_- and E_+ equidistant from E_0. But it would be better if you didn't have to do this.

Date: January 16, 2006.