

1) It's not really possible to have a wave that destructively interferes everywhere. Even if destructive interference happens for a time, after the waves pass through each other, they reappear with all their original energy. (A bit weird, but not too crazy.)

2) Energy can be transferred from electric fields (which are what interact with electrons to produce an image in an interferometer) to magnetic fields in the electromagnetic wave we call light. When the electric field is out of phase, the magnetic field can be in phase (or partially in phase) and thus during the cancellation, the energy from the electric field is put into the magnetic field. This is similar to the exchange between kinetic and potential energy in waves on a string. (At the point on the string in a wave when the string is not stretched, all the energy is kinetic; where it's not moving, all the energy is potential... and the wave travel constantly transforms one to the other.)

3) I wasn't quite able to get this to work on my machine, but I think this would explain the answer: <http://www.youtube.com/watch?v=RRi4dv9KgCg> .