



by jok church

Dear Beakman,  
When will we be able  
to use a transporter  
like in Star Trek?

Ronny Schumacher  
Kenosha, Wisconsin

Beakman or Jax  
P.O. Box 30177  
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Question, name & address



### FAMOUS DEAD GUY IN PHYSICS

Nobel Prize  
Physics, 1932

Mr. Heisenberg discovered the *Uncertainty Principle*. Usually it is called the Heisenberg Principle as a way of honoring him. Mr. Heisenberg realized that every time you measure where something is, or how fast it is going, you change the thing you're measuring.

He said, "Whenever I make a measurement, I must disturb the system. In order for me to know something is there, I must bump into it."

Werner Heisenberg  
1901-1976

Dear Ronny,  
Sometimes science fiction is prescient (PRESH-ent) and predicts the future. Other times it's just good entertainment.

Star Trek's transporter is the second of those two – good entertainment.

The laws of the universe, which are usually called *physics*, get in the way of Scotty (or Chief O'Brien) beaming up (or energizing) anyone or anything. And you can't change or ignore the laws of the universe.

*Beakman*  
Beakman Place



To beam a pile of marbles (or atoms) from disk A to disk B, you'd need to know precisely where the atoms are in relation to each other.

Without that, you couldn't reassemble anything properly. And we are not ever able to know precisely where they are for certain because of the Uncertainty Principle.



## HEISENBERG PRINCIPLE: THE MIND MOVIE

Ask someone to read this to you out loud. Sit comfortably with your eyes closed. Get all peaceful-like by taking a couple of long, deep breaths.

Imagine that you are beside a swimming pool and you want to know the temperature of the water.

You touch your pocket and feel that there is a thermometer inside it. You pull out the thermometer and put it into the water. When you lift out the thermometer, *You Can* see that the water is 88°.

Now let's rerun this part of the movie all over again, except you are now a giant, 80 stories tall, and the swimming pool is now as small as a drop of water.

When you bring the thermometer out of your pocket, it will be about 98° - nearly your body temperature. It's

also huge – as big as a small building.

When you put it into the tiny water-drop-sized pool, the warmer thermometer will raise the temperature of the water. By measuring something, you changed it.

Because we always change the things we measure, we can't really know exactly where anything really is. With big stuff it's not much of a problem. But as things get small, like subatomic-particle small, it's a bigger and bigger problem.

Star Trek's transporters have a circuit called the *Heisenberg Compensator*. It's supposed to make up for the fact that we change things by measuring them.

The *Heisenberg Compensator* does not exist and probably never will because you can't just change the laws of the universe.

P.S. from Jax: Have you ever noticed that sometimes the crew touches their communicator pins to turn them on, and other times they just talk and the pins go on themselves? Wouldn't that get embarrassing in the bathroom?