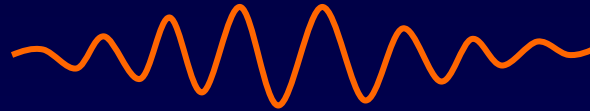


# Why "Uncertainty"?

"Uncertainty" refers to our inability to make definite predictions.

Consider this wave packet:



- Where is the object?
- What is its momentum?

The answer is, We don't know. We can't predict the result of either measurement with an accuracy better than the  $\Delta x$  and  $\Delta p$  given to us by the uncertainty principle.

Each time you look, *you find a local blip* that is in a different place (in fact, it is your looking that *causes* the wavefunction to "collapse"!).

If you look many times, you will find a **probability distribution** that is spread out

But you're **uncertain about where that local blip will be in any one of the times you look** -- it could be anywhere in the spread.

**An important point: You never observe the wave function itself.**

The wave merely gives the probabilities of obtaining the various measurement results. A measurement of position or momentum will always result in a definite result. You can infer the properties of the wave function by repeating the measurements (to measure the probabilities), but that's not the same as a direct observation.