Uncertainty Principle

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1) The Fourier transform frequencies spread out as the PDF becomes more highly concentrated, since to have an interpolation that minimizes error, functions with higher frequencies will fit data better than their lower frequency counterparts.

2) From the uncertainty principle, the more we know about momentum the less we know about the location of the particle. Thus we may know the momentum very well, but not the location of the particle.

3) If 100% exact momentum is known, that would imply via the uncertainty principle we have an exactly 0% chance of knowing where a particle is. Probabilistically we may approach a 0% chance of knowing, but never ascertain this limit. Δp would be zero and therefore violate the uncertainty principle.