

Fourier Transforms



1. (small hole) Δx small \longleftrightarrow Δp_x large (large pattern)

what if Δx is large

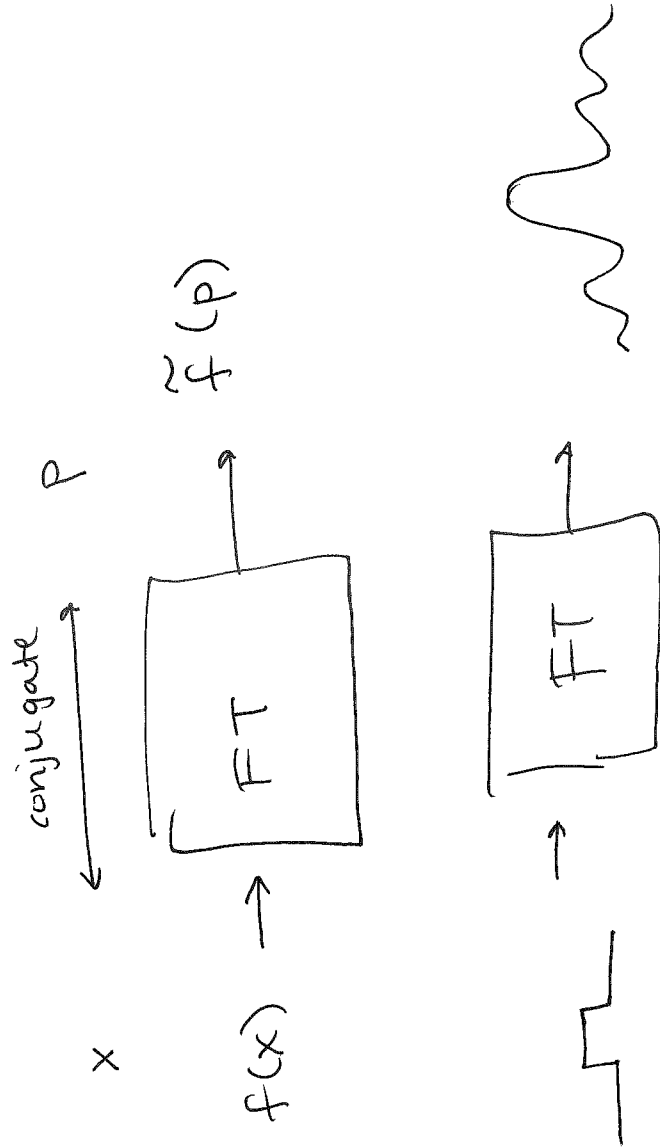
2. ~~what if Δx is large~~ maximum amount of knowledge: $\Delta x \Delta p_x = \frac{h}{2}$

3. what if we want to quantify p ?



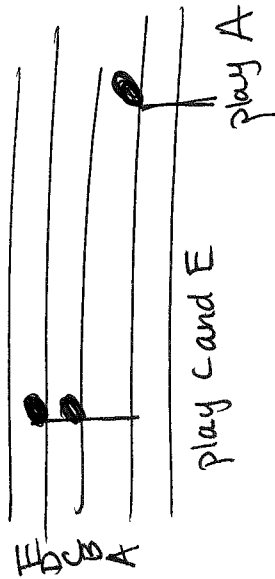
Fourier Transforms

There is a process that can take you between conjugate variables = F.T.



FT Example: Music Notes

frequency (pitch) representation



C:  A 

E 

time 2

time 1

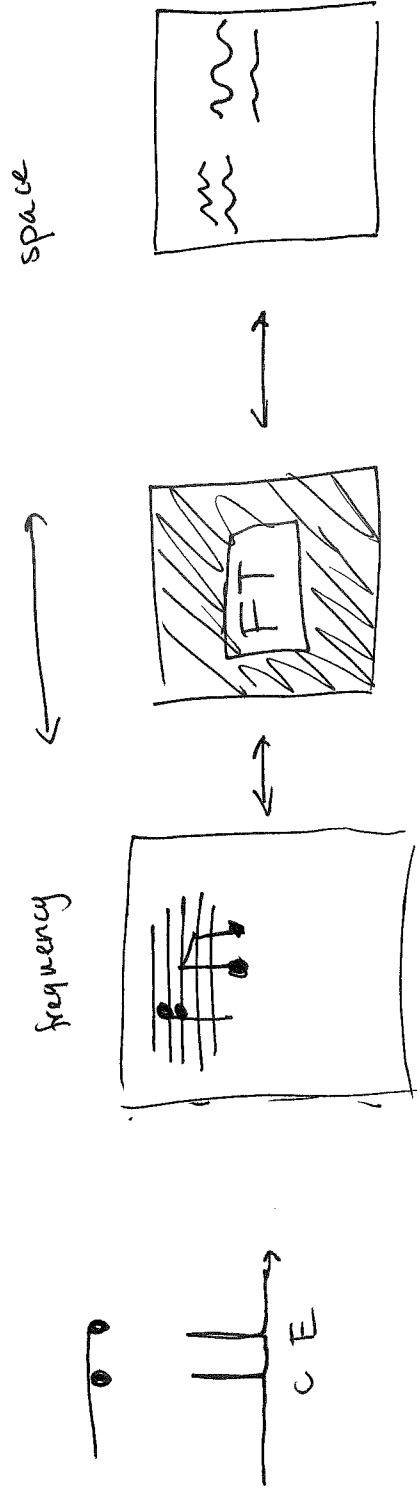
spatial (position) representation
~~sound wave~~



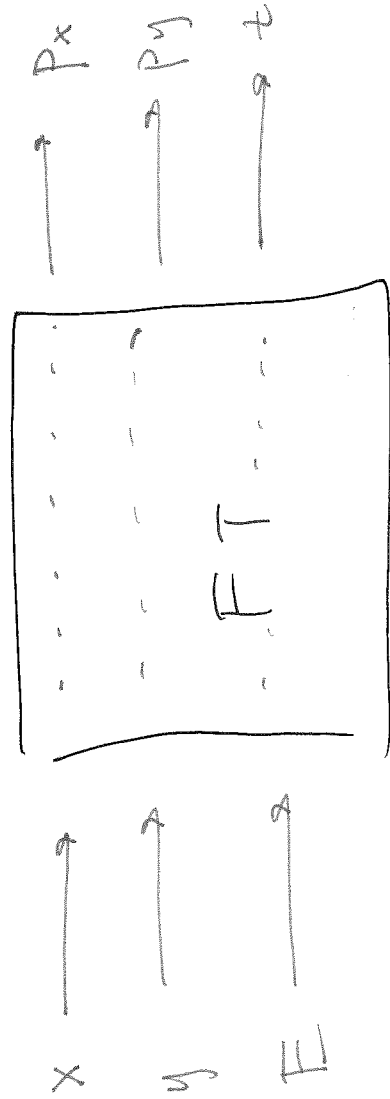
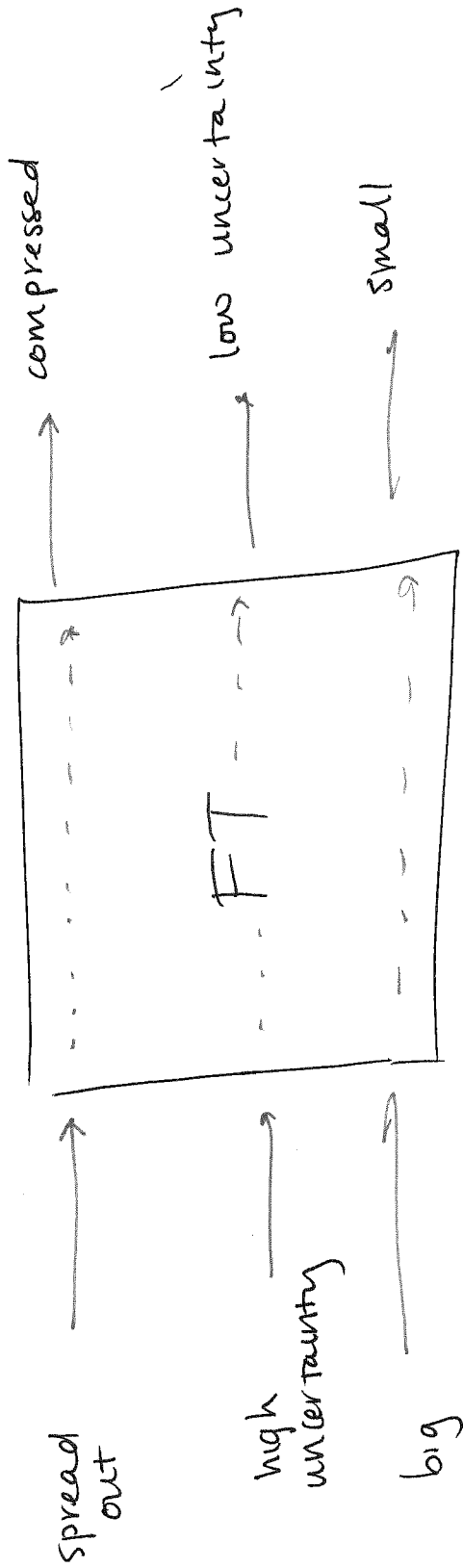
time 1

time 2

A FT is like a machine that takes you from one space to another

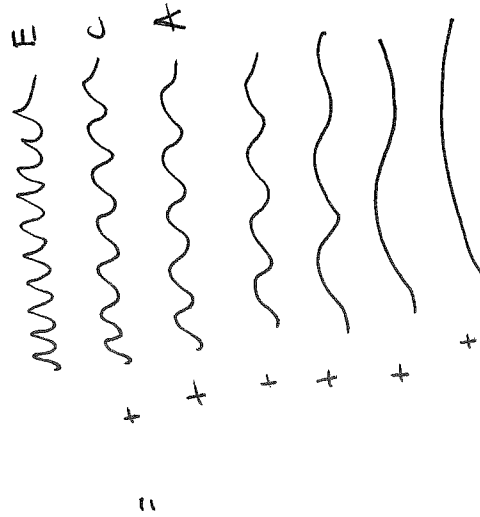
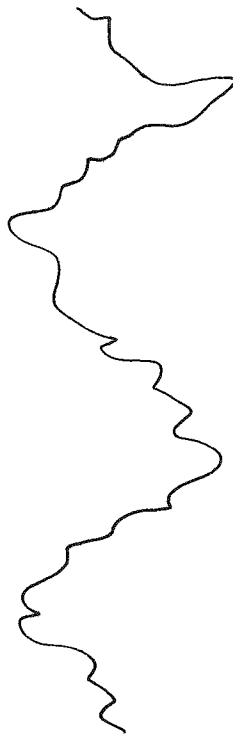


Mathematical Representation



Fourier Decomposition

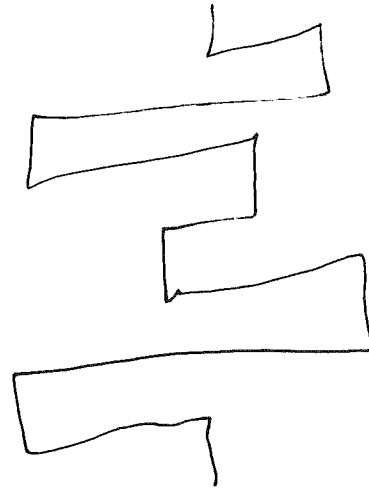
spatial representation



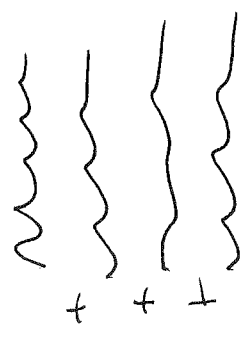
can make something
really complicated ...

out of many
"simple" waves

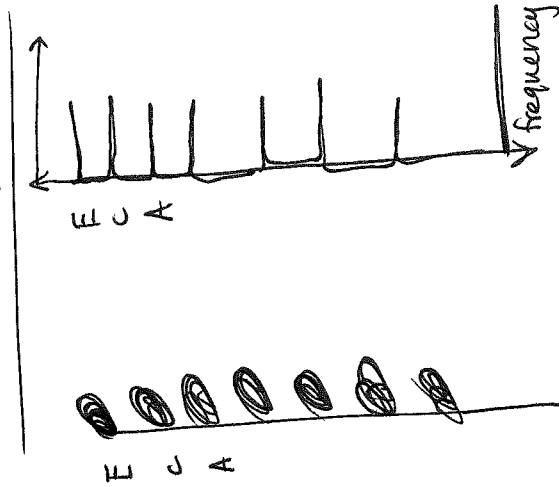
breaking down (decomposing) a function



building up (composing)
a function



frequency representation



top view

side view

frequency