

0.1 Operators \rightarrow observables

0.1.1 Operators, Bases, Linear Algebra

Observables include our old friends $\hat{x}, \hat{p}, \hat{H}, \hat{L}, \hat{s}$.

What is an operator tho?

$$\hat{A}: \mathcal{H} \rightarrow \mathcal{H}$$

also \exists adjoint operator, A^\dagger from \mathcal{H} to itself.

We can construct projection operators by taking the outer product of two vectors.

Also lets us have some resolution of identity by summing over the projection operators in any orthonormal basis.

Also, matrix representations exist by arranging $A_{mn} = \langle \varphi_m | \hat{A} | \varphi_n \rangle$, for some particular basis φ_i

In other words

$$\hat{A} = \sum_{ij} |\varphi_i\rangle A_{ij} \langle \varphi_j|$$

Cute stuff with the momentum operator.