

## DIRAC FORMULATION OF QM

MORE POWERFUL AND MORE GENERAL  
THAN WAVEFUNCTIONS. ALL SERIOUS  
PHYSICISTS USE IT.

LET'S ABSTRACT GENERAL FEATURES OF QM

- WAVEFUNCTIONS CAN BE LINEARLY  
SUPERPOSED WITH COMPLEX COEFFS

MATHEMATICAL STRUCTURE IS  
COMPLEX LINEAR VECTOR SPACE

BASIC OBJECT IS

'STATE KET'  $|\psi\rangle$

REPRESENTING  
STATE OF  
SYSTEM

A PARTICULAR SET OF STATES ARE ENERGY  
EIGENSTATES

$$H|n\rangle = E_n|n\rangle$$

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WE ALSO HAVE COMPLEX CONJUGATES OF WAVEFUNCTIONS AND EIGENSTATES

REPRESENT THESE BY 'STATE BRAS'

$$\langle \psi | \quad \text{OR} \quad \langle n |$$

- THE OVERLAP OF WAVEFUNCTIONS

$$\int dx \phi(x)^* \psi(x)$$

GENERALIZES TO

UNITARY INNER PRODUCT FOR  
BRAS AND KETS

$$\langle \phi | \psi \rangle = \text{COMPLEX NUMBER}$$

GIVING OVERLAP  
OF  $|\psi\rangle$  AND  $|\phi\rangle$

$\langle \phi | \psi \rangle$  SATISFIES RULES EXPLAINED  
IN MATHS METHODS COURSE...

$$\text{EG. } \langle \phi | \psi \rangle = \langle \psi | \phi \rangle^*$$