

# Cast of Characters

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## THOMAS YOUNG

1803 (double-slit experiment)

## ALBERT MICHELSON, EDWARD MORLEY

1887 (Michelson-Morley experiment)

## GEORGE FRANCIS FITZGERALD

1888 (FitzGerald contractions)

## HENDRIK ANTOON LORENTZ

1893 (Lorentz transformations)

## ELECTRON

1897 (discovered)

## MAX PLANCK

1900 (quantum hypothesis)

## ALBERT EINSTEIN

1905 (photon theory)

1905 (special theory of relativity)

## HERMANN MINKOWSKI

1908 (space-time)

## NUCLEUS

1911 (discovered)

## NIELS BOHR

1913 (specific-orbits model of the atom)

## ALBERT EINSTEIN

1915 (general theory of relativity)

## LOUIS DE BROGLIE

1924 (matter waves)

## NIELS BOHR, H. A. KRAMERS, JOHN SLATER

1924 (first concept of probability waves)

## WOLFGANG PAULI

1925 (exclusion principle)

## WERNER HEISENBERG

1925 (matrix mechanics)

## ERWIN SCHRÖDINGER

1926 (Schrödinger wave equation)

1926 (equates matrix mechanics with wave mechanics)

1926 (visits Bohr in Copenhagen to attack the idea of quantum jumps—and gets the flu)

## MAX BORN

1926 (probability interpretation of wave function)

## NIELS BOHR

1927 (complementarity)

## CLINTON DAVISSON, LESTER GERMER

1927 (Davisson-Germer experiment)

## WERNER HEISENBERG

1927 (uncertainty principle)

## COPENHAGEN INTERPRETATION OF QUANTUM MECHANICS

1927

## PAUL DIRAC

1928 (anti-matter)

## NEUTRON

1932 (discovered)

## POSITRON

1932 (discovered)

## JOHN VON NEUMANN

1932 (quantum logic)

## ALBERT EINSTEIN, BORIS PODOLSKY, NATHAN ROSEN

1935 (EPR paper)

## HIDEKI YUKAWA

1935 (predicts meson)

## MESON

1947 (discovered)

## RICHARD FEYNMAN

1949 (Feynman diagrams)

## SIXTEEN NEW PARTICLES

1947-1954 (discovered)

## MANY WORLDS INTERPRETATION OF QUANTUM MECHANICS

1957

## DAVID FINKELSTEIN

1958 (one-way membrane hypothesis)

## QUASARS

1963 (discovered)

## QUARKS

1964 (hypothesized)

## J. S. BELL

1964 (Bell's theorem)

## DAVID BOHM

1970 (implicate order)

## HENRY STAPP

1971 (nonlocal connections re: Bell's theorem)

## STUART FREEDMAN, JOHN CLAUSER

1972 (Freedman-Clauser experiment)

## TWELVE NEW PARTICLES

1974-1977 (discovered)

## ALAIN ASPECT

1982 (Aspect experiment)

# Why Quant Theory?

(A) Black body radiation

(B) Particle-wave Duality

photons  $\leftarrow$

electrons  $\leftarrow$

(C) Atomic Spectra

H-atom spectrum

Old Quant Theory

Handout

de

de Broglie matter  
wave