



The association of wave and particle aspects in the works of Louis de Broglie and his collaborators, and novel developments

Daniel Fargue & Claude Daviau
(Institut Louis de Broglie, Paris)

Abstract

Because he believed, following Einstein, that light was at the same time an actual corpuscle and a wave closely bound together, L. de Broglie extended this twofold property to any matter and founded quantum wave mechanics.

He never gave up his hope of a clear description of this association. Since the link between wave and corpuscle was a relativistic property, he extended relativistic wave mechanics starting from Dirac's electron to light and higher spin particles together with his co-workers. He later developed the "double solution theory": extending the dynamics of the wave to the relativistic case, looking for a nonlinear wave equation for particles, and avoiding configuration space.

Most of these ideas are now conformed by the extension of relativistic and gauge invariances and a generalization of electromagnetism including the four kinds of interactions and all kinds of particles.