



Influence of Louis de Broglie's Matter Wave Theory on Japanese physicists

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Abstract

Louis de Broglie (1892-1987), a French physicist who proposed the conception of matter waves, kept away from the Copenhagen school that drove the formation of quantum mechanics and took a different position in the interpretation of it. This study analyzes how de Broglie's theory, which stands out for its unique idea in the history of quantum mechanics, was accepted in Japan.

1. Tokio TAKEUCHI (1893-1944)

Japanese physicists began to translate papers on quantum mechanics vigorously including de Broglie's matter waves theory from around 1927. Among them, Tokio Takeuchi, who published abridged translation of de Broglie's dissertation for the first time in Japan, was especially impressed by de Broglie's way of thinking which deduced matter waves using Einstein's relativity. Because he had been waiting for integrating the theory of relativity with the quantum theory since 1922 and that's one of the reasons why Takeuchi introduced de Broglie's original thought spending 10 pages in the first part of his book *Shinrikigaku oyobi hadourikigaku sousho* (New mechanics and wave mechanics) published in 1927.

2. Satoshi WATANABE (1910-1993)

Satoshi Watanabe who had read Takeuchi's book in his high school days, left for France in 1933 after graduating from Tokyo university, and he studied under de Broglie till 1937. He translated de Broglie's book, *Introduction à l'étude de la Mécanique ondulatoire* and published *Hadourikigaku kenkyu josetsu* (Introduction to wave mechanics) in 1934. In the translator's notes, Watanabe stated that there seemed to be a disproportionate bias towards German physics in Japanese physics to date and that the simplicity of French physics had been forgotten. According to Watanabe, the national character of Japanese was probably more inclined inspirational and leaping French physics, so he translated de Broglie's book to compensate for a lack of French esprit.

3. Takehiko TAKABAYASHI (1919-1999)

De Broglie developed his matter waves theory to his pilot waves theory at the fifth Solway International Conference in 1927, but few scientists approved it and he also gave it up until 1951 when he returned to his original idea. From 1956 to 1959, Takehiko Takabayashi joined de Broglie's seminar at Institut Henri Poincaré and had a heated discussion with D.Bohm (1917-1992), N.P. Vigier (1920-2004) and others. In 1970, he translated de Broglie's pupils' book, J.L. Andrade e Silva (1928-2017) and G. Lochak (1930-2021) *Quanta, grains et champs* (Quanta, grains and field) published in 1969 and introduced their research as a new interpretation of wave mechanics, which contributed to a better understanding of their view in Japan.