Louis de Broglie and the diffusion of quantum mechanics in France (1925-1960)

Adrien Vila Valls

Manchester, 26/07/2013

Summary :

- Overview of the diffusion of quantum mechanics in France and the role of Louis de Broglie in this process.

- Reasons for rejecting the legacy of Louis de Broglie after World War II.

Theoretical physics in France between1925-1940)

- Before the late of the twenties :
- Only two genuine theoretical physicist : de Broglie and Léon Brillouin.

- 1928 : creation of IHP (Henri Poincaré Institut)
- Institutionalization of theoretical physics.
- Emergence of a generation of quantum physicist.

Structure of the « quantum community » in France (~1930-1940)

« Independent »	Louis de Broglie's group
Brillouin	De Broglie
Goldstein	Destouches
Solomon	Petiau
Elsasser	Dugas
Proca	Février
Tizsa	Kwall
Perrin	Winter
Bauer	Datzeff
	Tonnelat

Structure of the « quantum community » in France (~1930-1940)

Applied Quantum Physics	General Physics Quantum
Brillouin	De Broglie
Goldstein	Destouches
Solomon	Petiau
Elsasser	Dugas
Winter	Février
Tizsa	Kwall
Perrin	Proca
Bauer	Datzeff
	Tonnelat

Structure of the « quantum community » in France (~1930-1940)

Internationally openness	No stay abroad
Brillouin	De Broglie
Winter	Destouches
Solomon	Petiau
Elsasser	Dugas
Proca	Février
Tizsa	Kwall
Perrin	Tonnelat
Bauer	Goldstein
Datzeff	

Can we talk about a de Broglie's school of waves mechanics ?

- A true influence of de Broglie's orientation upon French quantum developments.

- Real intellectual autonomy of its pupils

Institutional role played by Louis de Broglie

- A passive leader: a prestigious name in the service of isolated initiatives.
  Example: Broglie-Destouches' Seminar .

- An asset for key positions in theoretical physics.
  Example: Proca-Destouches

A story of postwar physicists

- Anatole Abragam : « The case of Louis de Broglie painfully poses the problem of a genius who made a great discovery, a single one, and then must live with this discovery. [...] But the second great idea does not come, will never come, and the physicist who had a genius idea, and does not accept having only than talent locks himself in an impossible quest, leaves himself gradually circumvent and chambering by flatterers, by incapables, by illuminated if not crooks, and then the French theoretical physics is in the thirty-sixth below ». (*De la physique avant toute chose*, Odile Jacob, 2000).

New quantum spaces

- Proca's seminar (1947-1955)
- Commissariat à l'Energie atomique (CEA) : theoretical physics team (Messiah, Bloch, Horowitz, Trocheris…)
- Ecole normale supérieur: Maurice Lévy's team
- Ecole d'été des Houches since 1951 (Cécile Morette-DeWitt).

Travel broadens the Quantum mind

- Princeton, Copenhague, Manchester, Bristol … : places to stay for leaders of the new generation.

- New practices :
  - teamwork.
  - Place of experimental data.
  - Pragmatism.

Development of areas of applications for QM in France

- High energy physics, quantum solid-state physics, nuclear physics.

➢ Theoretical specialisations.

➢ Quantum Mechanics as tool instead of as issue

« International school » VS de Broglie's group (~1950-1960)?

de Broglie's group	*« International school »*
Between 10 and 20 theoretical physicists	More than one undred theoretical physicists
Main topic : Foundations of quantum mechanics	Main topic : Solid State Physics, Particle's physics, Nuclear Physics
Henri Poincaré Institut (IHP)	CEA, Orsay, ENS, Polytechnique….

Conclusion

- A desire to fit into the mainstream of the international theoretical physics.
- New opportunities and new ways allowed by institutional renewal of French science.
- The specialization of areas of application of quantum mechanics

Thank–you !