



Louis Leprince-Ringuet



Alès, France, 27 Mar. 1901 - Paris, France, 23 Dec. 2000

Title Honorary Professor of Elementary Particle Physics, Ecole Polytechnique, Paris, France

Nomination 11 Aug. 1961

Most important awards, prizes and academies

Membre de l'Académie des Sciences, France, depuis 1949; Membre de l'Académie Française depuis 1966; Membre de l'Académie Pontificale des Sciences; Divers prix de la Société Française de Physique et de l'Académie des Sciences.

Summary of scientific research

Après avoir été élève de l'Ecole Polytechnique, Ecole Supérieure d'Electricité, Ecole Sup. des Télécommunications (1920-1924), mon premier poste fut celui d'ingénieur des câbles sous-marins. En 1929, entrée au laboratoire privé de Maurice de Broglie. Etude des transmutations artificielles grâce à la réalisation d'un amplificateur très sensible relié à une chambre d'ionisation détectant les passages des particules rapides résultant des transmutations.

Divers travaux sur les particules émises, puis sur les neutrons; A partir de 1933 étude des rayons cosmiques. Expériences en latitude (entre Hambourg et Buenos-Aires) avec P. Auger; Expériences au Jungfrauoch sur la nature des composants. Après ma nomination, en 1936, comme professeur à l'Ecole Polytechnique, je quitte le laboratoire de M. de Broglie pour créer un centre de recherches à Polytechnique; Travaux sur l'énergie des rayons cosmiques avec une chambre de Wilson, dans le grand électro-aimant de l'Académie des Sciences. En particulier: Mesure de la masse du méson par collision élastique. Entre 1939 et 1945 travaux sur spectre et nature des rayons cosmiques avec chambre de Wilson, compteurs et champ magnétique à Largentière. Après 1944 construction d'un laboratoire à 3550 m. d'altitude (aiguille du Midi de Chamonix). Puis équipes de travail avec ballons-sonde stratosphériques et détection par émulsions épaisses des particules du rayonnement cosmique. Entre 1950 et 1957, installation de deux grandes chambres de Wilson superposées au Pic du Midi de Bigorre (3000 m. d'altitude) pour l'étude des gerbes pénétrantes, des mésons lourds (découverte du $K\mu$ μ -neutrino), des hyperons.

Puis orientation de mon laboratoire de Polytechnique et du Collège de France (depuis 1958) vers le CERN.

Je n'ai plus de contribution personnelle, mais mes élève B. Gregory, A. Lagarrigue, A. Astier, F. Müller, etc. ont joué un grand rôle dans le succès du CERN.

Main publications

Réalisation d'un amplificateur proportionnel pour l'étude des transmutations artificielles. (1930); *Les transmutations artificielles.* Herman édit., 1933; *Effet de latitude des rayons cosmiques* (avec P. Auger). (1934); *Observation des composantes du rayonnement cosmique au Jungfrauoch* (en collaboration). (1935); *Etude des rayons cosmiques avec l'électro-aimant de l'Académie des Sciences.* (1936 à 1939); *Vérification directe de la variation de masse avec la vitesse.* (1939); *Mesure de la masse du méson par choc élastique* (en coll.). (1941); *Composante pénétrante du rayonnement cosmique.* (1944-1948); *Désintégration du méson lourd en un muon et un neutrino* (en coll.). (1953). Livres: *Les rayons cosmiques, les mésons.* Hermann, 1945; *Des atomes et des hommes.* Fayard, 1949; *Les grandes découvertes du 20^e siècle.* Larousse, 1952; *Les inventeurs célèbres.* Editions Mazenod, 1964; *La science contemporaine.* Ed. Larousse, 2 tomes; 1967;

Science et bonheur des hommes. Flammarion, 1972; et d'autres livres moins exclusivement scientifiques chez Flammarion (Le grand Merdier, la Potion magique, les Pieds dans le plat Noces de diamant avec l'atome, Foi de Physicien Ed. Bayard); En plus, le cours de physique de l'Ecole Polytechnique et 15 cours différents chaque année au Collège de France, à la Chaire de physique nucléaire (1958 à 1972).

Commemoration - Louis Leprince-Ringuet was born in March 1901. His father was an engineer who graduated from the 'Ecole Polytechnique' and was even a member of the 'Corps des Mines' composed of the best former students of this school. Louis was not an excellent student. Nevertheless, he too graduated as an engineer from the 'Ecole Polytechnique' and also from the 'Ecole supérieure d'Electricité', and became member of the 'Corps des PTT'.

Birth of his vocation as a scientist

For five years he worked in an undersea cable Company. He spent eight months each year at sea on missions to check the good general state of the communications network. He liked this outdoor activity. In addition he had personal experience of the hard conditions in which the workers operated. In 1928-1929 he was fortunate to meet Maurice de Broglie – the elder brother of Louis de Broglie who received the Nobel prize. Maurice was an enthusiastic physicist who ran in his town house, in Paris, his own laboratory working on X-rays. The young Leprince Ringuet was fascinated by Maurice de Broglie. He decided to quit his first job in order to accept Maurice de Broglie's proposal to work in his laboratory as a research assistant. It was the start of his scientific career, a very modest beginning. The laboratory had only a few permanent physicists, around three or four, who consequently worked very closely with the 'boss'.

Physicist on Cosmic rays

When Louis Leprince-Ringuet joined this team, their research topic was undergoing change, passing from X-rays to nuclear physics. They began to be interested in the structure of atomic nuclei and in the particles produced on breaking these nuclei. At that time, it was impossible to obtain particles with an energy of more than one GeV. That is why Leprince-Ringuet decided to work on cosmic rays. These rays consist of high-energy particles which bombard the earth. Mostly, they are protons. On collision with the upper atmosphere, they create new particles which arrive on the ground. In 1933, with another young physicist, Pierre Auger, they sailed on a ship from Hamburg to Buenos Aires with an array of detectors, Geiger counters, in order to investigate the variation of intensity with the latitude and to prove that, effectively, protons were predominant. Over two decades, cosmic rays were the best source of fundamental constituents of nuclei. In order to have better conditions, physicists built laboratories on high mountains. Leprince-Ringuet, who had been appointed to a new laboratory at the Ecole polytechnique, worked frequently at the 'Pic du midi' observatory in the Pyrenées. Many new fundamental particles have been discovered by this method: the positron, the muon, the pion, the kaon, the hyperon, using a Wilson chamber and, after the war, a double Wilson chamber. Leprince-Ringuet, who became Professor at the Ecole polytechnique in 1936, had the possibility to attract many bright young students who were to become outstanding physicists, such as Lagarigue, Gregory and Astier.

Towards physics of high energy particles

After 1953, Leprince-Ringuet decided to reorient his laboratory's activity towards the physics of accelerators in order to take advantage of the first synchrotrons with their intense and precise beams of particles with an energy exceeding one GeV. In conjunction with Saclay, his laboratory designed new 'bubble chambers' in order to replace the Wilson chambers and made a bright use of CERN which very often led to important discoveries. Member of the French 'Académie des sciences' in 1949, he succeeded Frederic Joliot in 1959 in his chair at the 'Collège de France'. For more than ten years, he was the head of two famous laboratories working in particle physics. He had a great influence on the rapid development of this discipline as a member of important committees, in particular those running the CERN programme. He used it in order to give young physicists wanting to work in this field the best conditions. Leprince-Ringuet may be considered one of the greatest scientists working in particle physics in the twentieth century, not so much for his personal discoveries – although they were important – but especially for his exceptional ability to encourage bright young talent to work in this field and also to persuade the decision-makers to favour its development. **Extraordinary diversity of talents and interests**

So far, I have shown that Louis Leprince-Ringuet was a great scientist. This has long been recognised by our Company with his election as member of the Pontifical Academy of Sciences. But he was not an exceptional student. He spent many years in a job which gave him the possibility to sail for two thirds of the time. He became a scientist not through special studies or reading, but through meeting and talking with a man who was a living epitome of scientific research and who devoted a part of his house and of his wealth to scientific activity. The theme of Leprince-Ringuet's work was a very attractive one: observation of many particles which come from the universe. To capture them, he sailed for two months; he built an observatory on a mountain summit. He spent the best part of his energy in developing his own laboratory and helping create this 'marvellous

cathedral' which is the CERN. However, this scientist was fascinated not only by the particles which came from breaking the nuclei, but also by people. One of his books, the one I prefer, is called *Des atomes et des hommes*. He experienced and described beautifully the particular friendship and brotherhood among the scientists working on the same adventure. He organized for many years in September meetings of his collaborators and colleagues in his own private property in Burgundy to discuss the new discoveries or topics he wanted to present in his course at the 'Collège de France'. But what is for me the most remarkable was his gift for talking to people, to explain to any public not only scientific achievements, but also his personal views on topics of interest for the listeners. He developed this natural capacity when he was a student as member of the 'équipes sociales', an institution devoted to the organization of meetings and exchanges of views between young workers and students. He was invited over many months to give a regular prime-time television programme: 'le quart d'heure de Leprince Ringuet', which was very successful and in which he talked about various topics, not necessarily scientific. He had many centres of interest. He was a ranked tennis player. He was a painter whose works have often been on public display in good Parisian art galleries. He was a music lover and had been chosen to be President of the 'Jeunesses musicales de France', a very famous and popular institution of the country. He was very cultured, elected of course to the 'Académie des sciences' but also to the 'Académie française', in 1966, rather exceptional for a scientist. He did not like philosophical or abstract discussions. He was a man of action. He was a strongly active supporter of Europe, very enthusiastic, a committed Christian, not so much attracted by theology, but deeply rooted in the Gospel which shaped his intense spiritual life. With his remarkable wife, they brought up a wonderful family, being great-grandparents of a lot of children. He was a very happy man. At ninety-five, he wrote a marvellous book: *Foi de physicien – Testament d'un scientifique*. The introduction is entitled 'the happiness of being a scientist'. The last chapter is: 'Why I am an optimist'.

Paul Germain