



UNIVERSITÀ DEGLI STUDI
DI MILANO



International Symposium

"Highlights in Physics Today:

One Hundred Years After The Birth Of Beppo Occhialini "

Aula Magna of the Università degli Studi di Milano

Via Festa del Perdono 7 - Friday February 16th 2007

The year 2007 marks the centenary of the birth of Giuseppe Occhialini, known as "Beppo" to the scientific community contemporary to him. He was born on 5 December 1907 at Fossombrone, in central Italy and died in Paris on 30 December 1993.

When he arrived in Milan in 1952, Beppo Occhialini was already well-known at an international level for two important results, milestones in the development of twentieth-century scientific knowledge. The first: the discovery, made in 1932 with Patrick M.S. Blackett at the Cavendish Laboratory, in Cambridge, UK, of electron-positron pairs. This not only confirmed the existence of the positive electron - "the positron" - discovered just a few weeks before by Carl Anderson in the United States, but gave the first proof of the existence of "anti-matter" predicted by the theoretical physicist P. M. Dirac. Determinant for this result was the association of a Wilson chamber exposed to cosmic rays with a coincidence circuit, made with Geiger counters, to control the chamber expansion. The coincidence circuit was applied in Cambridge by Occhialini who had learnt of it at the *Scuola di Arcetri*, in Florence, from Bruno Rossi, its inventor.

The second break-through was the discovery, in 1947, of the "pi meson" at the Wills Laboratory, Bristol, UK, with C. F. Powell and G. M. C. Lattes (in one of the works on this subject of the Bristol group there is also the contribution of H. Muirhead). This particle had been predicted by the Japanese theorist Yukawa about ten years before. It was the first discovery of a particle carrying the strong force which keeps protons and neutrons united in the nuclei of the atoms. This discovery was obtained using photographic emulsions exposed to cosmic rays at altitude as detectors. The intuition and the refined experimental ability of Beppo Occhialini were, also in this case, an important contributing factor.

A few years later, the Nobel Prize was awarded, respectively in 1948 and 1950, to Blackett ("for his development of the Wilson cloud chamber method, and his discoveries therewith in the fields of nuclear physics and cosmic radiation.") and then to Powell ("for his development of the photographic method of studying nuclear processes and his discoveries regarding mesons made with this method. "). At the time of the discovery of the e^+/e^- pairs in 1932, Occhialini was only 25 years old; Blackett acknowledged his contribution and, when he collected the Nobel Prize, he wrote to him saying that "... it would be right that you are by my side in Stockholm". As far as the pi meson is concerned, it should be remembered that its discovery and the assignment of the Nobel to Powell took place just

after the Second World War, not an easy period for a person like Occhialini who had just returned to Europe from voluntary exile in Brazil.

Bruno Pontecorvo summarised the strange fate of Beppo Occhialini effectively and affectionately through an imaginary toast: "I raise my glass with the hope that you can collaborate with Occhialini in some experience, it is a practically certain way for you to win the Nobel Prize," (Proceedings of the Milan Symposium for the 20th anniversary of the return of Occhialini to Italy).

After his return to Italy at the beginning of the 1950s, and after a short period in Genoa, Occhialini came to Milan as a Professor of "Fisica Superiore" at the *Università degli Studi di Milano* in 1952 and stayed there until he retired from academic life. In Milan, in the old Physics Institute at via Saldini 50, he formed his nuclear emulsions research group. It was focussed on the study of cosmic rays (G-Stack collaboration...) and, more generally, on the physics of Elementary Particles (K-collaboration...) through extensive international collaboration. His school had in Milan a strong influence on this field of research. This influence is still alive through those of his collaborators who remained in this field and, with his guidance and help, moved, in the 1960s, from cosmic rays to particle accelerators and from nuclear emulsion to bubble chambers and electronic detectors.

From the early 1960s, Occhialini founded a group, the "Gruppo Spazio", to study the astrophysical properties of cosmic rays, which carried out observations at altitude, firstly with stratospheric balloons, then with rockets and finally with artificial satellites. It was through these activities that Italy and Milan soon acquired positions of excellence in the field of High Energy Astrophysics and even more so in X-Ray and Gamma Ray Astronomy. Beppo Occhialini also played an active role in the organisation of this type of activity, founding what were to become the Laboratories and Institutes of Astrophysics of the CNR and contributing to the creation of the current Italian and European space agencies (ASI and ESA). The Italian-Dutch satellite Sax, which made a determining contribution to establishing the nature of the different sources of gamma rays, was named "Beppo-Sax" in memory of Beppo's commitment.

The physicists of the Università Statale di Milano and Università Statale di Milano Bicocca have decided to celebrate the centenary of Beppo Occhialini's birth with various initiatives including the publication of a volume of writings, "The Scientific Legacy of Beppo Occhialini" which will be published at the end of 2006. It is jointly edited by the publishing house of the Società Italiana di Fisica (Italian Physics Society) and Springer Verlag. Another important event will then be the International Symposium "Highlights in Physics Today: One Hundred Years After The Birth of Beppo Occhialini", which will be held in the Aula Magna of the Università degli Studi di Milano at Via Festa del Perdono 7 on Friday, February 16 2007.