

## MENDEL SACHS

### *IN MEMORIAM*

Mendel Sachs (born 13 April 1927, Portland, Oregon, a US theoretical physicist, was Professor of Physics at the State University of New York at Buffalo (1966-1997) (Emeritus since 1997). He died on May 5, 2012 at the age of 85.

Dr. Sachs's main interests and publications were in the theory of general relativity and its relation to elementary particle physics, astrophysics and cosmology, as well as the philosophy of physics. He was especially concerned with resolving the major conflict in 20th century physics, that between the quantum and relativity theories, which began with the divergent views of Einstein and Bohr. Based on his own research program, it was Dr. Sachs's conclusion that Einstein was right after all, in his idea that the foundations of physics and the universe are based on continuity, holism, determinism, total order, and realism. This is in contrast to Bohr's view of fundamental atomism, indeterminism and positivism. It is Dr. Sachs's view that the paradigm of atomism will shift in the 21st century to the paradigm of holism.

Dr. Sachs spent over a half century continuing in the direction of Einstein's mature vision of physics characterized by the fundamentality of the matter field encompassing all domains of matter, from elementary particles to the planets and stars, and beyond, all to be brought together through a unified explanation of the main forces known to physics : the weak and strong forces, electromagnetism, and gravity. Einstein was not able to realize his dream of a unified field theory due to a persistence in holding to reflection symmetry in his general relativity theory. In his adoption of a quaternion formalism for general relativity, Sachs was able to recast the equations of general relativity without reflection symmetry and expand the explanatory scope of the theory.

Many important discoveries resulted from Sachs's general relativity theory. These include a unification of electromagnetism and gravity (i.e.

the unified field theory envisioned by Einstein), a derivation of quantum mechanics as a linear approximation of relativity as a fundamental theory of inertia; and predictions of the Lamb shift, the muon, and the Pauli Exclusion Principle, among others. One other very important discovery underlying much else was the true nature of what is taken to be particle-anti-particle pair annihilation. Dr. Sachs showed that when particles and anti-particles come together, they actually form an extremely tight bond (and don't annihilate). They exist as a dense sea of coupled pairs (in excess of 1040 pairs/cm<sup>3</sup>), with zero electrical charge. There is constant flow between the dense, pair-bound state and that of the free-particle, physical world. The dense state is an alternative explanation of dark matter now understood as a significant force in astrophysics, though it is also extremely important in the shaping of the atomic domain, including the underlying explanation of mass.

Dr. Sachs's research program and discoveries are expounded in 13 books and over 200 journal articles, and at his website : [mendelsachs.com](http://mendelsachs.com)

MICHAEL SACHS

La Rédaction des Annales est endeuillée par le décès d'un de ses collaborateurs les plus fidèles et présente ses condoléances à la famille de Mendel Sachs.

Elle remercie aussi Mendel Sachs pour ses nombreuses contributions aux Annales de la Fondation Louis de Broglie :

1. *On wave-particle dualism*, **1**, p. 129, (1976)
2. *On Einstein's views of the relativity and quantum theories and their future*, **4**, pp. 85, 175, (1979)
3. *Considerations of an oscillating spiral universe cosmology* **14**, p. 361, (1989)
4. *Einstein and the Evolution of Twentieth-Century Physics* **16**, p. 241, (1991)
5. *Unified field theory revisited* **17**, p. 163, (1992)
6. *On Quantum Mechanics from General Relativity : A Dialogue With J.S. Bell* **20**, p. 33, (1995)

7. *On the separation of matter and antimatter in the early universe* **20**, p. 323, (1995)
8. *The Future of Physics ?* **22**, p. 271, (1997)
9. *Quantum Mechanics From General Relativity : Particle Probability from Interaction Weighting ?*, **24**, p. 25, (1999)
10. *From atomism to Holism in 21st century physics*, **26**, p. 389 (2001)
11. *Cornelius Lanczos - Discoveries in the Quantum and General Relativity Theories*, **27**, p. 85, (2002)
12. *From Hawkings A Brief History of Time to his The Universe in a Nutshell*, **28**, p. 225, (2003)
13. *On concepts of law and truth*, **28**, p. 485, (2003)
14. *The Quantum Negative Energy Problem Revisited*, **30**, p. 381, (2005)
15. *The Legacy of Einstein and Bohr*, **31**, p. 383, (2006)