the second quantisation formalism. There are sections on the pairing interaction, the linked-cluster expansion, the Brueckner–Hartree–Fock theory, the local density approximation, the pairing-plus-quadrupole interaction and the microscopic theory of valence forces.

The last two chapters are devoted to electromagnetic transitions and weak interaction phenomena. After a description of the nuclear electromagnetic current and the quantised electromagnetic field the selection and sum rules governing electromagnetic transitions are obtained and illustrated by examples. The section on weak interaction begins with the theory of β decay and goes on to consider different types of transitions, orbital electron capture, antineutrino absorption, electron–neutrino angular correlation, the helicity of the neutrino, muon decay, vector currents, forbidden beta decay and absorption of muons by nuclei.

This brief summary of the main topics can do little to indicate the wealth of detail and comprehensiveness of the coverage of the book. It is difficult to think of any important aspect of nuclear structure physics that has not been covered, and the vast range of topics is welded into a coherent whole.

The treatment is generally at the graduate student level, and requires only a general familiarity with nuclear physics such as may be obtained in an undergraduate course. It will also serve as a valuable reference book for undergraduates and a handbook for professional nuclear physicists.

P. E. Hodgson

Denial of quantum physics

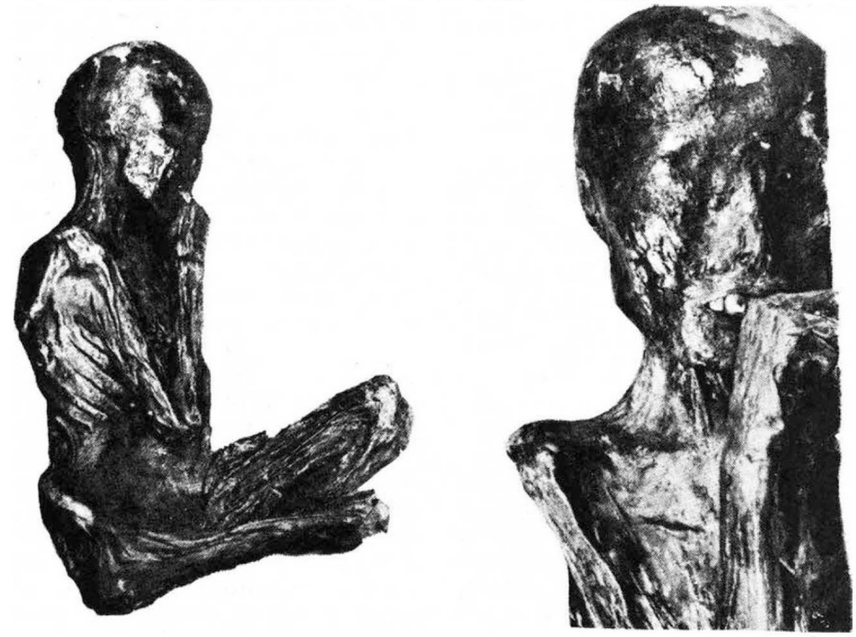
The Interpretation of Quantum Mechanics. By Michael Audi. Pp. xiv+200. (University of Chicago: Chicago and London, 1973.) £5.75.

THE main purpose of this book is to show that the classical conception of a particle, particularly the attribution of simultaneous position and momentum to a particle, can be carried over to quantum mechanics. The core of the argumentation runs as follows: classical mechanics can be separated into two parts. First, a material body can be represented as a collection of particles, each particle having at all times an exact position and an exact momentum and thus travelling in a continuous path in space. Second, the path of a particle is determined by laws of motion. In quantum mechanics, however, there exist no laws of motion for atomic particles, and the indeterminacy of observations is due to the unpredictability of the paths of material atomic particles.

This means, of course, that it is erroneous to ascribe any wave property to a material atomic particle. Conversely, the particle property of photons is denied. A photon is considered to be oscillations in the electromagnetic field, and all the experimental evidence of the corpuscular character of electromagnetic radiation is explained as "discrete interaction properties" of the electromagnetic field with matter. Obviously this amounts to a total rejection of the complementarity of quantum physics.

By means of his thesis about the unpredictability of the (postulated) paths of material atomic particles, the author is to some extent capable of protecting his classical conception of an atomic particle from the experimental facts in quantum physics. But on page 106 it is rightly stated that any satisfactory interpretation of quantum mechanics must provide an explanation of crystal diffraction phenomena. Now the classical particle concept will come to its crucial test, the reader thinks. But instead of introducing in some statistical way the postulated particle trajectories, the incident beam of particles is represented in the usual quantum mechanical way by a plane wave function, which is then perturbed by a periodic potential representing the crystal. Though it is indeed an interference phenomenon which the author sketches in these calculations, he does not like to say so. Multiple slit experiments are treated along the same line, and the argument ends up with the rather cryptic statement that each particle in the beam passes through one particular slit, but, nevertheless, more than one slit is acting on the particle.

The parts of the mathematical scheme of quantum theory involved in the argument are far too sketchily presented and several equations are blurred by misprints. Also, the author seems to minimise the significance of points which oppose his basic position, and in some cases he simply leaves out such points. For instance, the Copenhagen interpretation of quantaum mechanics is said to be inconsistent because it claims that quantum physics contains classical physics as a limiting case and yet it does not consider atomic particles as classical particles. One should expect, then, that the author would examine very carefully the correspondence between the two fields of experience. On pages 34–35 he claims to have sketched a derivation of the classical Hamilton-Jacobi equation from Schrödinger's equation in the limit where the quantum of action can be considered to be vanishingly small. It really cannot be called a derivation because it involves equations which are mathematically objectionable, and, furthermore, the most important result in this connection, namely that the wave packet representing the atomic object moves according to the laws of classical mechanics, is left out. Yet this result shows that the complementary behaviour of atomic objects displayed through interference phenomena and particle phenomena is fully compatible with the classical particle concept, applying, of course, only to observational situations where the quantum of action can be neglected.



Two views of 'Little Al', found in Salts Cave in Kentucky. The surrounding region is well known for the richness of its archaeological remains. From *Archaeology of the Mammoth Cave Area*. (Studies in Archaeology.) Edited by P. J. Watson. Pp. 21+255. (Academic: New York and London, July 1974.) $16.00; £8.00.