"BETWEEN QUANTUM AND COSMOS: STUDIES AND ESSAYS IN HONOR OF J.A.WHEELER" EDITED BY W H ZUREK, A van der MERWE & W.A.MILLER. (PRINCETON UNIVERSITY PRESS) 1988, pp.

Few people have made fundamental contributions to as many fields in physics as has John Archibald Wheeler. He has been making pioneering contributions to many diverse fields in physics since 1937. Not only has Wheeler been a great physicist, he has always been a teacher- a person who has demystified new ideas and prepared a generation of physicists to work on them.

The volume under review is a Festchcrift for J.A.Wheeler on his 75th birthday. It is collection of papers and articles on many diverse fields, from the topology of space-time to free will. The diversity of the topics is an indication of the interests of Wheeler, who as Bekenstein quotes, "believes that there is no such thing as a relativist or a cosmologist but only a physicist". This aversion to narrow specialization is evident in the introductory article on Wheeler's contribution to physics by Thorne and Zurek. Deviating from normal practice of giving an account of his achievements, they have a collection of annotated quotations of Wheeler which gives us an idea of the diverse nature of his interests. Starting from clustering theory in 1937, we see that his contributions to the theory of nuclear fission, QED, measurement theory, quantum gravity and other foundational aspects of physics are truly path breaking.

Roughly two thirds of the forty articles in this volume could broadly be categorized under the 'Cosmos' part of the title. These include Prigogine on the Birth of Time, DeWitt on The Topology of Space Time, Kuchar on Geometrodynamics and Bekenstein on Gravity and Spontaneous Symmetry Breaking. Most of these articles are related to the work of Wheeler himself on cosmology and gravity. For example, Demianski's paper on Static Electromagnetic Geon extends the work of Wheeler who introduced the idea of an electromagnetic geon. (An e.m. geon is formed from electromagnetic radiation bound by gravitation.) Miller's paper on the geometrodynamic content of Regge equations is another extension of the geometrodynamical approach pioneered by Wheeler. In fact as Brill writes in his paper on Barrier Penetration in Kaluza-Klein Theories, "Our view of four dimensional space-time today was shaped in large measure by two men, Einstein and Wheeler. Einstein introduced us to the richness of curvature; we owe to Wheeler the recognition that a similar richness is provided by topology." A survey of the papers on cosmology and gravity in this part of the book gives an idea of the extraordinary contributions of Wheeler-- not only by working in the field but also by stimulating work through suggestions and ideas.

The second part of the book contains articles on the 'Quanta' part of the title. Here again we have some very prominent workers in the field writing about the measurement problem in quantum mechanics (Dicke, Espagnat), computational physics (Feynman, Hartle and Geroch, Landauer) and philosophy of physics (Deutsch, Peres, Bennet). Feynman in an

extraordinarily lucid paper discusses quantum limitations to computation. Without any jargon, he lays down the fundamental issues in physical limits to the functioning of computers. Hartle and Geroch talk about computability and physical theories i.e. the application of theory to make predictions by means of a specified algorithm. This is all very speculative but it is interesting to see ideas from computation enter physics in a fundamental way. Deutsch in a brief but fascinating paper critically examines Wheeler's idea of 'law without law'. This is an attempt to answer the question 'is there a fundamental or ultimate law of physics from which everything else is derivable'? Peres talks about free will in the context of Bell's inequality and Bennet examines the nature of complexity in discrete systems.

Each paper in this volume is prefaced by a sketch by Wheeler. Apart from the artistic quality of these sketches, these illustrate ' the essence of physics that forms the framework of his deep insight into the inner workings of nature'. There is a description of these drawings at the end of the book and even by just reading this one gets a feeling of the originality and depth of Wheeler's ideas. A few minor blemishes however appear in this otherwise well produced volume. There are a number of typos and at least in one place a reference is missing (Reference 12 in Deutsch's paper) which is frustrating.

In their preface, the editors write that ' the measure of impact of a scientist has on his field is best provided by the influence of his ideas on his colleagues'. By this measure few physicists can claim to be as successful as John A. Wheeler. This volume gives a very good picture of the influence of one man on the subject of physics and the quest for understanding the universe.