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Introduction

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Basil Hiley was born in Burma (currently also known as Myanmar) in 1935 and grew up in India during the Second World War. His father was an officer in the British "Raj", the Indian region under British control. For Basil this meant on the one hand that his early schooling was not always very smooth, as the family was moving from place to place every six months or so. But on the other hand it meant that he had a lot of freedom and had to learn to work independently. In this freedom he developed a love for mathematics. He was very excited about a little book on higher algebra for Indian schools and already at eight he was working out the textbook exercises on his own.

The family moved to England after the war when Basil was twelve years old and he got into Brockenhurst High School in Hampshire. Inspired and encouraged by his high school physics master, he ended up studying physics at King's College, London, where he also did his PhD on the Ising Model under Cyril Domb. The thesis included a study of the coiling properties of polymer molecules.

During the final year of his PhD work Basil participated in a meeting organized by the Maxwell Society, the physics student society of King's College, where one David Bohm—about whom Basil at this point knew very little—was giving a lecture. Basil recalls being absolutely spellbound: "He was asking the sort of questions that I had

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been worrying about as an undergraduate, and not only [was he] giving some answers, but his attitude was, you know, 'And you out there can come and help and do this kind of thing"' (Hiley interviewed by O. Freire, 2008 [2]). Basil responded passionately to this attitude, telling his wife Sylvia who was also attending the meeting "I am going to work with this man". Not too long afterwards, in 1961, Basil was offered a job at the physics department at Birkbeck College, London University, where Bohm had recently taken the chair of Theoretical Physics. This led to a collaboration which gave rise to a number of significant articles and culminated in the publication in 1993 of their joint book *The Undivided Universe: An Ontological Interpretation of Quantum Theory* (London: Routledge) [1].

It is always hard to appreciate the contribution to science of a person who has, for a significant part of their scientific career, worked in collaboration with a great physicist. There is no doubt that David Bohm, with whom Basil worked at Birkbeck College from 1961 until Bohm's death in 1992, was one of the deepest thinkers about quantum theory and his publication in 1952 of his paper on the causal interpretation of quantum mechanics continues to be influential. Apart of course from the discovery of what became known as the "Aharonov-Bohm effect", work in the interpretation of quantum mechanics is what Bohm is most remembered for.

Both Bohm and Hiley considered that the causal interpretation addressed questions concerning reality only on a superficial level. In fact they spent little of their own research in this direction believing instead that the answers to quantum theory's problems (and not just problems of interpretation) should be sought in a completely new approach. The investigation of the precise and detailed processes that, according to the causal interpretation, give rise to quantum phenomena, was left to others. Bohm's and Hiley's main interest was to demonstrate that quantum mechanics, including the causal interpretation, was emergent from a deeper, more significant level of reality. The troublesome non-locality that was brought out so clearly in the many-particle version of Bohm's causal interpretation, was to be understood as a manifestation, or an explication, of a deeper, implicate level in which notions of separate objects and even space-time played no fundamental role. They struggled to formulate clearly both formal and informal notions of order in general and the notion of an implicate order in particular, which they perceived as the ultimate ground of the reality of all experience—including scientific measurements.

Hiley has been mainly concerned with the mathematical formulation of Bohm's philosophical conception of the implicate order. Algebraic relations are not explicitly formulated in space and time and in the abstract algebraic approach to quantum theory Bohm and Hiley had seen a fertile ground for the development of their philosophical ideas. The correspondence between certain algebraic structures and those of the quantum theory is well known, but in recent years Hiley has sought to establish such algebraic structures as the mathematical counterpart of the fundamental processes that constitute the essence of Bohm's notion of an implicate order. In the algebraic approach, observables and states are formalized as elements of an algebra and fundamental processes arise as algebraic automorphisms. Although the notion of process algebra goes back to Hermann Grassman, such structures and processes should not be thought of merely as elegant mathematical formulations; for Hiley they have fundamental ontological status. The philosophical ramifications of the algebraic ontological approach adopted by Hiley have yet to be explored in depth.

To honour Basil's 75th birthday Paavo Pylkkänen and Harald Atmanspacher organized a symposium 11th–13th November 2010 in Helsinki, Finland, including several public talks and an in-depth workshop. This special issue contains a selection of the papers presented in this symposium. We would like to thank SHI R&D Ltd, Gothenburg; the Federation of Finnish Learned Societies; The Philosophical Society of Finland; and the Department of Philosophy, History, Art and Culture Studies at the University of Helsinki for their generous support.

In the preface that follows Harald Atmanspacher will further describe Basil's unique contribution to physics. He also conveys the joy and dynamism that all who have had the privilege of interacting with Basil have experienced.

References

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