

Bibliography on Quantum Logics and Related Structures

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The bibliography contains 1851 references on axiomatic structures underlying quantum mechanics, with stress on varieties of algebraico-logical, probabilistic, and operational structures for which the term *quantum logics* is adopted. An index of about 250 keywords picked out from the titles is included and statistics about papers, journals, and authors are presented. Monographs and proceedings on the subject are noted.

This is an interdisciplinary bibliography on axiomatic structures underlying quantum mechanics, with stress on a number of structures which the International Quantum Structures Association recognizes as aspects of and includes in quantum logics. (The Association was founded on 15 September 1990 in Gdańsk during the Quantum Logics meeting.)

In the literature, quantum logic is given many different meanings. It is considered to be an orthomodular, partially ordered set with the set of states defined on it (Gudder, 1970a), simply an orthomodular lattice (Nánásiová, 1986), a row of algebraico-logical structures recently named quantum propositional logic (Lock and Hardegree, 1985), and finally manuals and semi-Boolean algebras named quantum events logics (Lock and Hardegree, 1985a). Such a variety of definitions reflects different approaches taken by physicists, mathematicians, logicians, and philosophers of physics, who have all contributed to the field. For the purpose of compiling this bibliography, I consider quantum logic to mean all the above-mentioned structures, and under "related structures" I mean the most relevant references to the other axiomatic approaches, notably Segal algebras, C^* -algebras, von Neumann algebras, and state-observable probability approaches, as well as some more

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"exotic" axiomatics, provided they are technically well elaborated. In addition, a certain number of mathematical elaborations which have turned out to be of particular importance and of direct influence are included. For surveys and comparisons of the approaches see Gudder (1979) and Holdsworth and Hooker (1983).

The main aim of this bibliography is twofold: first, to draw the attention of researchers of different profiles to each other, and second, to fill the gap in the bibliographic material available on the field.

The only other bibliography on quantum logic proper is Beehner's (1980). It is compiled mostly from the point of view of the physicist and the philosopher of physics. Holdsworth and Hooker (1983) give many references on axiomatic quantum mechanics, stressing logic and the philosophy of physics. The bibliographies of Kalmbach (1983a, 1986) on lattices contain many references to quantum logic as covered by a mathematician. The Ω -bibliography87 (Müller *et al.*, 1987) should also be mentioned here, as well as the following sections of *Mathematical Reviews*: 03G12—Quantum logic; 81B10—Logical foundations of quantum mechanics; and 06C15—Complemented lattices, orthocomplemented lattices.

The present bibliography brings together the approaches of the above bibliographies. The references the author has come across over the years overlap suitably those from the aforementioned sources.

No topical divisions have been made. The extensive overlapping of the algebraic, logical, and probabilistic aspects of the structures considered makes any grouping more appropriate for a subsequent resource letter. Here, rather informative titles enabled a T_EX program to make an index which is given at the end of the bibliography. The keywords for the index were picked out from the reference titles by Dr. J. Pykacz.

An attempt has been made to make the bibliography friendly to second, third, . . . , authors by listing them *all* in alphabetical order.

The bibliography contains 1851 references and is backed up by a data bank. The data bank makes it possible to obtain statistics about papers, journals, and authors. Here, I stress some figures which might be relevant and important for researchers in the field.

The number of papers appearing annually in journals (i.e., excluding proceedings) stabilized in the early 1970s at about 50. The figures are as follows. In the period 1961–1965 the average number of papers published annually in journals was 10.8; in 1966–1970, 30.2; in 1971–1975, 47.0; in 1976–1980, 54.2; in 1981–1985, 60.6; and in 1986–1990, 55.0.

The average number of all references appearing annually is for 1961–1970, 26.3; for 1971–1980, 88.5; and for 1981–1990, 100.9.

The five most important journals for the authors included in this bibliography are *International Journal of Theoretical Physics*, in which 127 papers appeared, *Foundations of Physics* (110), *Journal of Mathematical Physics*

(77), *Reports on Mathematical Physics* (54), and *Communications in Mathematical Physics* (50). *International Journal of Theoretical Physics*, *Journal of Mathematical Physics*, and *Reports in Mathematical Physics* have published papers in this area regularly over the last 25 years. *Communications in Mathematical Physics* published 44 papers between 1967 and 1982 and only 7 between 1983 and 1990. The papers in *Foundations of Physics* up to 1988 are much more "related" than "belonging" to quantum logic "proper." However, the two most recent volumes contain a considerable number of quantum logic papers "proper."

Other significant journals are the *Notices*, the *Proceedings*, and the *Transactions of the American Mathematical Society* (56), *Mathematica Slovaca* (33), *Journal of Philosophical Logic* (32), *Algebra Universalis* (29), *Bulletin of the Polish Academy of Sciences* (27), *Annales de l'Institut Henri Poincaré* (26), *Synthèse* (26), *Pacific Journal of Mathematics* (26), *Helvetica Physica Acta* (25), *Nuovo Cimento (+Lettere)* (22), *Studia Logica* (22), *Demonstratio Mathematica* (21), *Philosophy of Science* (19), *Canadian Journal of Mathematics* (17), and *British Journal for the Philosophy of Science* (15).

The *Annales de L'Institut Henri Poincaré (Physique)* and the *Proceedings of the American Mathematical Society* have published papers in the field regularly. Others are mostly unequally distributed over the years. In particular, *Helvetica Physica Acta* published 90% of its papers in this area between 1959 and 1979 and only 10% between 1980 and 1990, while in another physical journal, *Nuovo Cimento*, 90% of the papers listed appeared between 1978 and 1990, as opposed to 10% between 1960 and 1977. Of the mathematical journals, *Algebra Universalis*, *Demonstratio Mathematica*, and *Mathematica Slovaca* published the majority of their papers in the 1980s, while the other mathematical journals did so in the 1970s.

As for the "philosophical" journals, figures for *Journal of Philosophical Logic*, *Synthese*, and *Philosophy of Science* tempt one to conclude that philosophy of physics is losing its interest in the subject: about 80% of the papers appeared in the 1970s.

In this bibliography, 575 authors appear and I estimate that roughly 400–450 of them have been engaged in the field "proper" for some time. Since, on the other hand, only 112 authors wrote or took part in writing five or more references, it turns out that the fluctuation of the researchers in the field is rather high. Yet another aspect of this is that on average 1.3 authors write a paper.

Finally, I list the monographs and proceedings at least partially dedicated to the field. In accord with Library of Congress cataloguing practice, proceedings are mostly referred to by the place where the meeting or symposium was held. In entries under the editor(s) name(s), such a reference name is indicated by boldface.

The monographs are Beltrametti and Cassinelli (1981a), Beran (1985), Birkhoff (1948), Bub (1974), Cohen (1989), Destouches-Février (1951), Fáy and Törös (1970), Gibbins (1987), Giuntini (1990), Grätzer (1978), Gross (1979), Gudder (1979b, 1988d), Haack (1974), Jajte (1985), Jammer (1974), Jauch (1968), Kalmbach (1983a, 1986), Kläy (1985), Ludwig (1954, 1971, 1978, 1983/1985, 1985a, 1987), Mackey (1963), Maeda and Maeda (1970), S. Maeda (1980), Meskov (1986), Mittelstaedt (1972a,b, 1976b, 1978a), Piron (1976a), Pitowsky (1989), Pták and Pulmannová (1989, 1991), Reichenbach (1944), Rüttimann (1977b), Scheibe (1973), and Varadarajan (1968, 1970).

The proceedings are Butts and Hintikka (1977), Cohen and Wartofsky (1969, 1974), Cologne78, 84, Erice79, Feldafing74, Fermi70, 77, Fort (1982/1985), Hooker (1975, 1979, 1979a), Ján88, 90, Klagenfurt82, Loyola77, 79, Marburg73, 79, Nitsch *et al.* (1981), Ontario71, 73I–III, 75, PSA74, 76, 78, 80, Suppes (1976, 1980), Tokyo83, Trieste72, Tutzing78, 80, 82, Vienna84, and Warsaw74.

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NOTE ADDED IN PROOFS

I finished this bibliography in January 1991 and my idea was to cover the references until 1990 (inclusive). I have therefore included some references which were accepted for publication at the time and of which I have mostly received copies of the galley proofs by the courtesy of their authors. Some of these references appeared in print in 1991 and I have entered the relevant data for them. But the reader should be aware that the year 1991 is far from being complete.

It has turned out that three items were misnumbered. Since the Bibliography has been reset their former numbers are missing and they are ascribed “interpolated numbers,” e.g., [1835A]. The index has been amended accordingly.

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