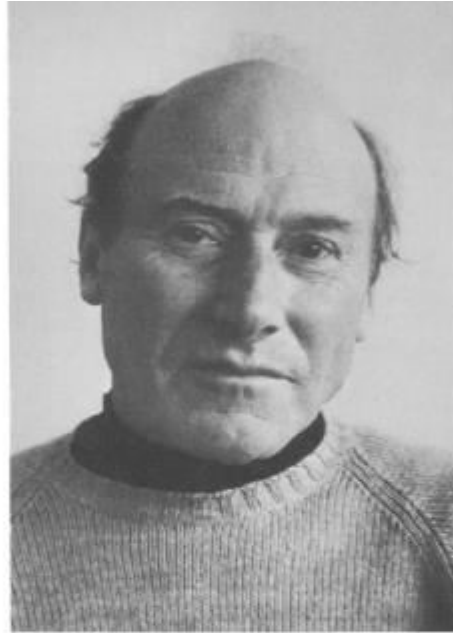


# Rudolf Haag and Res Jost





Rudolf Haag

Lieber Rudolf,

aus Deinen vielen Schülern, Verehrern und Freunden haben eine Handvoll sich mehr durch Zufall als durch Plan zusammengefunden, um Dir die Arbeiten in diesem Heft *Deiner* Zeitschrift, die *Du* durch Deine Arbeiten und durch Dein Wirken als ihr erster Herausgeber so wesentlich geprägt hast, zu widmen. Wir sehen in Dir den originellsten theoretischen Physiker mathematischer Richtung unserer Generation. Und wenn wir uns nach den Wurzeln dieser Eigenständigkeit fragen, dann fällt uns die glückliche Verbindung auf zwischen Deiner Fähigkeit, das Wesentliche in der Beschreibung der physikalischen Wirklichkeit zu abstrahieren und Deiner andern Begabung, für diese Abstraktion auch den richtigen mathematischen Rahmen zu finden: es ist das glückliche Zusammentreffen einer philosophischen Einstellung mit einer auf das Mathematisch-Konkrete drängenden Bestimmung, was Dich uns einzigartig macht.

Res Jost

# Communications in Mathematical Physics

Chief Editors: R Haag (1965-1973), K Hepp  
(1973-1976), J Glimm (1976-1978), A Jaffe  
(1978-2000), M Aizenman (2000-2012), Horng-  
Tzer Yau (2012- )

1995: 320 pages on mathematics and physics  
2015: 11985 pages on mathematics or physics



# The BOOKS

R. Jost 'The General Theory of Quantized Fields',  
American Mathematical Society', 1965

R. Haag 'Local Quantum Physics, Fields, Particles  
and Algebras' 2<sup>nd</sup> Ed. Springer, 1996

# R. Jost 'The General Theory of Quantized Fields', A M S, 1965

## Contents:

III. The axioms and the Wightman distributions

IV. The Wightman functions

V. The TCP-Theorem. Spin and statistics

VI. The Haag-Ruelle theory of asymptotic fields and particles

VII. Things not treated

1. Models

3. Analytic properties in  $n$ -space

R. Haag 'Local Quantum Physics,  
Fields, Particles, Algebras' 2<sup>nd</sup> Ed.  
Springer, 1996

Contents:

II. General Quantum Field Theory

III. Algebras of Local Observables and Fields

IV. Charges, Global Gauge Groups and Exchange  
Symmetry

V. Thermal States and Modular Automorphisms

VI. Particles. Completeness of the Particle Picture

VII. Principles and Lessons of Quantum Physics

# R Haag 'Quantum Field Theories with Composite Particles and Asymptotic Conditions', Phys Rev 112:669 (1958)

The connection between the Nishijima-Zimmermann method and the Ekstein method of treating collision processes between composite particles in quantum field theory is given. Starting from the point of view that the field is a local observable, the 'asymptotic conditions' are proved and generalized.



D Ruelle 'On the Asymptotic  
Condition in Quantum Field Theory',  
Helv Phys Acta 32:147 (1962)

A 'space-like asymptotic condition' is proved  
which allows Haag's approach to the asymptotic  
condition to be carried out rigorously in the  
framework of the Wightman axioms.

# K Hepp 'On the Connection between the LSZ and Wightman Quantum Field Theory', CMP 1:95

The LSZ asymptotic condition and the Yang-Feldman equations are derived in a Wightman quantum field theory on a dense set of scattering states. The Green's distributions are shown to be sufficiently regular around the energy shell to give well-defined reduction formulae for the scattering amplitudes.

# H Epstein 'CTP Invariance of the S-Matrix in a Theory of Local Observables', J Math Phys 8:750

In a theory of local observables as proposed by Haag and Araki, the assumptions, which make possible a collision theory also guarantee the CTP invariance of the S-matrix.

J Glimm, A Jaffe, T Spencer 'The Wightman Axioms and Particle Structure in the  $P(\phi)_2$  Quantum Field Model', Ann Math, 100:585 (1974)

The  $P(\phi)_2$  quantum field model with small coupling constant satisfies the Wightman axioms. The spectrum of the mass operator contains two isolated eigenvalues 0 and  $m > 0$ . Hence the model describes the scattering of particles of mass  $m$ .

W Hunziker, IM Sigal 'Time-  
dependent scattering of N-body  
quantum systems', Rev Math Phys  
12: 1033

# R Haag 'Fundamental Irreversibility and the Concept of Events' CMP 132:245 (1990)

It is proposed that the transmutation from possibilities to facts should be introduced as an essential element in fundamental theory. This has no bearing on TCP-invariance. If indeterminism is accepted it leads to picture of an evolving history formed by individual events and causal ties. In the low density regime it can be compared with the treatment of multiple collisions in quantum field theory.

R Haag 'On Quantum Theory',  
arXiv: 1602.054v1, 17 Feb 2016

Abstract by R Seiler:

A discussion of fundamental aspects of quantum theory is presented, stressing the essential role of events

# K Hepp 'Quantum Theory of Measurement and Macroscopic Observables', H P A 45:237 (1972)

The generation of probabilities from probability amplitudes in a quantum mechanical measurement process is discussed in the framework of infinite quantum systems. In several explicitly solvable models, the measurement process leads to macroscopically different 'pointer positions' and a rigorous 'reduction of the wave packet' with respect to all local observables.



# C Koch and K Hepp 'Quantum Mechanics in the Brain', Nature 440:611 (2006)



Does the enormous computing power of neurons mean consciousness can be explained in a purely neurobiological framework, or is there a scope for quantum computations in the brain?

Für Klaus Mepp  
mit Dank für Mäherlei und in  
Bewunderung seiner Begeisterung für  
alles Gute u. Schöne.

Arnold