

**Alex Blum**

**Statement**

**and**

**Readings**

## **Title**

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## **Abstract**

The use of the functional calculus in quantum field theory (QFT) came to prominence in the second half of the twentieth century, mainly due to Richard Feynman's path integral formulation of quantum theory. A first attempt at formulating a QFT based on functionals was already made in the late 1920s, most notably promoted by Wolfgang Pauli. These attempts were abandoned due to difficulties in defining a measure on the state space. In the following paper, I will first describe these initial attempts and how and why they failed. I will then describe how and why the problem which had led Pauli to abandon the functional method in 1929 did not reappear in the functional formulation of Feynman (nor in Julian Schwinger's action formalism, developed in response to Feynman's path integral), due to the marginalization of the notion of a quantum state in relativistic QFT. This development can be traced to attempts in the 1930s and 1940s to eliminate the notion of state from QFT altogether, in order to solve the divergence difficulties, in particular to Werner Heisenberg's S matrix and to Wheeler-Feynman electrodynamics.