

## **Proof of Kochen–Specker Theorem: conversion of product Rule to sum rule**

### **Abstract**

Valuation functions of observables in quantum mechanics are often expected to obey two constraints called the sum rule and product rule. However, the Kochen–Specker (KS) theorem shows that for a Hilbert space of quantum mechanics of dimension  $d \geq 3$ , these constraints contradict individually with the assumption of value definiteness. The two rules are not unrelated and Peres [Found. Phys. 26 (1996) 807] has conceived a method of converting the product rule into a sum rule for the case of two qubits. Here we apply this method to a proof provided by Mermin based on the product rule for a three-qubit system involving nine operators. We provide the conversion of this proof to one based on sum rule involving ten operators.

**Keyword:** Kochen-Specker Theorem; Hidden variables