

Abstract Submitted
for the 4CF13 Meeting of
The American Physical Society

How Certain is the Heisenberg Uncertainty Relation? JACOB J. COLLINGS, JEAN-FRANCOIS S. VAN HUELE, Brigham Young University — Since Heisenberg introduced the relation $p_1 q_1 \sim h$ in 1927 (*Zeitschrift für Physik*, 43, 172), great effort has been made to refine this expression and better understand its meaning. At least two completely different interpretations of Heisenberg's original relation have been developed; namely, an uncertainty (or indeterminacy) principle and an error-disturbance relation. In this contribution we emphasize the difference between these two manifestations of Heisenberg's original relation: on the one hand, a lower bound for the product of the standard deviations of non-commuting operators, and on the other hand, the intrinsic error and disturbance that occur in the measurements of complementary observables. It is especially this last relation that is currently the subject of debate. We review the concepts behind certain proposed useful reformulations of this relation and the experimental evidence for their validity. We illustrate the different relations with concrete examples using spin measurements.

Jacob J. Collings
Brigham Young University

Date submitted: 16 Sep 2013

Electronic form version 1.4