

The Quantum Mechanical Time Reversal Operator.

Holster, Andrew (2003) The Quantum Mechanical Time Reversal Operator. .

Full text available as:

[Microsoft Word](#) - Requires a viewer, such as [Microsoft Word Viewer](#)

Abstract

The analysis of the reversibility of quantum mechanics depends upon the choice of the time reversal operator for quantum mechanical states. The orthodox choice for the time reversal operator on QM states is known as the Wigner operator, T^* , where $*$ performs complex conjugation. The peculiarity is that this is not simply the unitary time reversal operation, but an anti-unitary operator, involving complex conjugation in addition to ordinary time reversal. The alternative choice is the Racah operator, which is simply ordinary time reversal, T . Orthodox treatments hold that it is either logically or empirically necessary to adopt the Wigner operator, and the Racah operator has received little attention. The basis for this choice is analysed in detail, and it is concluded that all the conventional arguments for rejecting the Racah operator and adopting the Wigner operator are mistaken. The additional problem of whether the deterministic part of quantum mechanics should be judged to be reversible or not is also considered. The adoption of the Racah operator for time reversal appears prima facie to entail that quantum mechanics is irreversible. However, it is concluded that the real answer to question depends upon the choice of interpretation of the theory. In any case, the conventional reasons for claiming that quantum mechanics is reversible are incorrect.

Keywords: Time reversal, quantum mechanics

Subjects: [Specific Sciences: Physics: Quantum Mechanics](#)

ID Code: 1449

Deposited By: [\[Nil\]](#), [\[Nil\]](#)

Deposited On: 21 October 2003