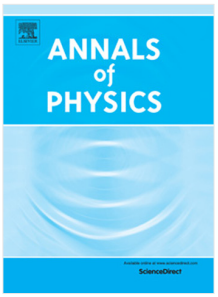
Accepted Manuscript



Experimental test of entangled histories

Jordan Cotler, Lu-Ming Duan, Pan-Yu Hou, Frank Wilczek, Da Xu, Zhang-Qi Yin, Chong Zu

PII: S0003-4916(17)30265-8
DOI: https://doi.org/10.1016/j.aop.2017.09.004
Reference: YAPHY 67489

To appear in: *Annals of Physics*

Received date : 4 October 2016
Accepted date : 11 September 2017

Please cite this article as: J. Cotler, L. Duan, P. Hou, F. Wilczek, D. Xu, Z. Yin, C. Zu, Experimental test of entangled histories, *Annals of Physics* (2017), https://doi.org/10.1016/j.aop.2017.09.004

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

*Manuscript
Click here to view linked References

MIT-CTP-4749

Experimental test of entangled histories

Jordan Cotler,[1] Lu-Ming Duan,[2,3,*] Pan-Yu Hou,[2] Frank Wilczek,[4,5] Da Xu,[2,6] Zhang-Qi Yin,[2,†] and Chong Zu[2]

[1]*Stanford Institute for Theoretical Physics, Department of Physics, Stanford University*

[2]*Center for Quantum Information, Institute for Interdisciplinary Information Sciences, Tsinghua University, Beijing 100084, China*

[3]*Department of Physics, University of Michigan, Ann Arbor, Michigan 48109, USA*

[4]*Center for Theoretical Physics, MIT, Cambridge MA 02139 USA*

[5]*Origins Project, Arizona State University, Tempe AZ 25287 USA*

[6]*Department of Physics, Tsinghua University, Beijing 100084, China*

Abstract

Entangled histories arise when a system partially decoheres in such a way that its past cannot be described by a sequence of states, but rather a superposition of sequences of states. Such entangled histories have not been previously observed. We propose and demonstrate the first experimental scheme to create entangled history states of the Greenberger-Horne-Zeilinger (GHZ) type. In our experiment, the polarization states of a single photon at three different times are prepared as a GHZ entangled history state. We define a GHZ functional which attains a maximum value 1 on the ideal GHZ entangled history state and is bounded above by 1/16 for any three-time history state lacking tripartite entanglement. We have measured the GHZ functional on a state we have prepared experimentally, yielding a value of 0.656 ± 0.005, clearly demonstrating the contribution of entangled histories.

* lmduan@umich.edu

† yinzhangqi@mail.tsinghua.edu.cn

Download English Version:

https://daneshyari.com/en/article/8201622

Download Persian Version:

https://daneshyari.com/article/8201622

Daneshyari.com