

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
15 June 2023 (15.06.2023)



(10) International Publication Number
WO 2023/107475 A3

(51) International Patent Classification:
G06N 10/00 (2022.01) *G06N 99/00* (2019.01)
B82Y 10/00 (2011.01)

(21) International Application Number:
PCT/US2022/051990

(22) International Filing Date:
06 December 2022 (06.12.2022)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
63/286,362 06 December 2021 (06.12.2021) US
63/292,868 22 December 2021 (22.12.2021) US

(71) Applicant: YALE UNIVERSITY [US/US]; Two Whitney Avenue, New Haven, CT 06510 (US).

(72) Inventors; and

(71) Applicants: PURI, Shruti [IN/US]; 315 Whitney Ave, New Haven, CT 06511 (US). CLAES, Jahan [US/US]; 111 Spoonwood Road, Wilton, CT 06897 (US).

(72) Inventor: SAHAY, Kaavya; Two Whitney Avenue, New Haven, CT 06510 (US).

(74) Agent: SCHLOTTER, Sarah, C.C. et al.; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210-2206 (US).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: TECHNIQUE FOR PREPARING A FAULT-TOLERANT CLUSTER STATE

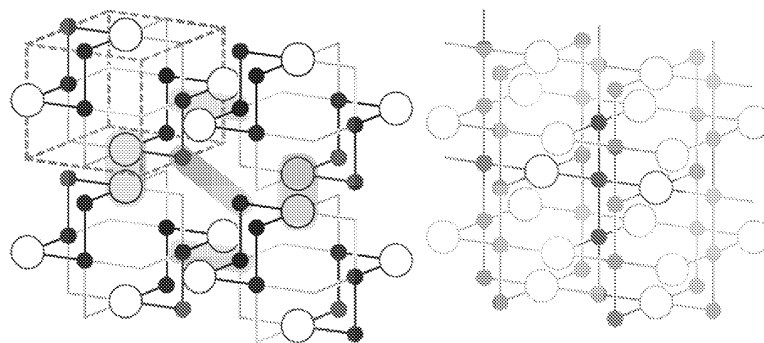


FIG. 9I

(57) Abstract: Quantum systems and techniques are described to generate fault tolerant cluster states for use in quantum computation, quantum networking, and other applications. The systems and techniques include initializing states in first qubits and generating initial resource states by performing first Pauli product measurements on sets of X-type and/or Z-type qubits of the first qubits, the initial resource states comprising qubit cluster states comprising at least three qubits. The final cluster state may then be generated by fusing two or more initial resource states, the fusing comprising performing second Pauli product measurements between qubits of two or more of the initial resource states.

[Continued on next page]

WO 2023/107475 A3

Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:

24 August 2023 (24.08.2023)

(15) Information about Correction:

see Notice of 20 July 2023 (20.07.2023)