14/06/2023

Min-Sat $\qquad C_j : [[P_j], [N_j]]$

$$H_M = \sum_i x_i$$

$$H_P = -\sum_j \prod_{k \in P_j} \bar{w}_k \prod_{l \in N_j} w_l$$

$$H_M H_P = -\sum_{i,j} x_i \prod \bar{w}_k \prod w_l$$

$$H_P H_M = -\sum_{i,j} \prod \bar{w}_k \prod w_l \, x_i$$

Case 1: $i \neq k ; i \neq l$

$$\Rightarrow H_M H_P = -\sum_{i,j} x_i \prod \bar{w}_k \prod w_l = -\sum_{i,j} x_i \prod \bar{w}_k \prod w_l$$

$$\Rightarrow H_P H_M = -\sum_{i,j} \prod \bar{w}_k \prod w_l \, x_i = -\sum_{i,j} x_i \prod \bar{w}_k \prod w_l$$

$$[H_M, H_P] = 0$$

Case 2: $i = k ; i \neq l$

$$\Rightarrow H_M H_P = -\sum_{i,j} x_i \bar{w}_i \prod \bar{w}_{k'} \prod w_l$$

$$H_P H_M = -\sum_{i,j} \bar{w}_i x_i \prod \bar{w}_{k'} \prod w_l$$

$$[H_M, H_P] = -i \sum Y_i \prod \bar{w}_{k'} \prod w_l$$

$$\bar{w} x = \frac{x - iy}{2}$$

$$-x \bar{w} = -\frac{x - iy}{2}$$

$$-iy$$

Case 3: $i \neq k ; i = l$

$$\Rightarrow H_M H_P = -\sum_{i,j} x_i w_i \prod \bar{w}_{k'} \prod w_l$$

$$H_P H_M = -\sum_{i,j} w_i x_i \prod \bar{w}_{k'} \prod w_l$$

$$[H_M, H_P] = +i \sum Y_i \prod \bar{w}_{k'} \prod w_l$$

$$w x = \frac{x + iy}{2}$$

$$-x w = -\frac{x + iy}{2}$$

$$+iy$$

15/06/2023

$$F(\beta) = \langle s | \, e^{+i\gamma H_P} \, e^{+i\beta H_M} \, e^{-i\beta H_M} \, H_P \, e^{-i\gamma H_P} \, | s \rangle$$

$|s\rangle$ is not eigen vector of H_P.

$$= \langle s | (\cos\beta + i \sin\beta H_P)(\cos\beta + i \sin\beta H_M) \, H_P \, (\cos\beta - i \sin\beta H_M)(\cos\beta - i \sin\beta H_P) | s \rangle$$

		C-1	C-2	C-3	C-4	C-5	score
$\|0\rangle$	(0,0,0)	x	✓	✓	✓	✓	4
$\|3\rangle$	(0,1,1)	✓	✓	✓	x	✓	4
$\|4\rangle$	(1,0,0)	✓	✓	x	✓	✓	4
$\|5\rangle$	(1,0,1)	✓	✓	✓	✓	✓	5
$\|7\rangle$	(1,1,1)	✓	x	✓	✓	✓	4

$|1\rangle, |2\rangle, |6\rangle \longrightarrow 5$