Continued from Page

Can verify that $\langle\psi|A\otimes B|\psi\rangle = tr(A^T B)\frac{1}{2}$

Thus bias $= \frac{1}{\sqrt{2}}\frac{1}{2}\frac{1}{4}\Big(tr(\sigma_z(\sigma_z+\sigma_x)) + tr(\sigma_z(\sigma_z-\sigma_x)) + tr(\sigma_x(\sigma_x+\sigma_z)) - tr(\sigma_x(\sigma_z-\sigma_x))\Big)$

$= \frac{1}{8\sqrt{2}}(8) = \frac{1}{\sqrt{2}} \Rightarrow w_q = \left(\frac{\frac{1}{\sqrt{2}}+1}{2}\right) = \cos^2(\pi/8)$

IV Tsirelson's Bound

Want to show $\forall$ $A_i, B_j, |\psi\rangle$, can't do better than

$A_i \to A_i \otimes I$
$B_j \to I \otimes B_j$ $\Rightarrow A_i B_j = A_i \otimes B_j$

bias $= \langle\psi| A_0B_0 + A_0B_1 + A_1B_0 - A_1B_1 |\psi\rangle$

$= \frac{1}{\sqrt{2}}\left(A_0^2 + A_1^2 + B_0^2 + B_1^2\right) - (A_0 \cdots B)^2$

positive terms

$\leq \frac{1}{\sqrt{2}} \cdot 4$

bias $= 2w_q - 1 \leq \frac{1}{4}\left(\frac{1}{\sqrt{2}} 4\right)$

So we can't do any better than quantum strategy described above

Continued to Page