WCF master Atul Tom with the cat

After self-testing phase, Alice and Bob share a state of the form

$$(V_A \otimes V_B)\,|GHZ\rangle$$

(V_A, V_B: isometries)

& Alice's measurement in her last box is $V_A^* \Pi_{x,a} V_A$.

Therefore, we can assume that Alice + Bob hold a state of the form

$$\frac{1}{\sqrt{3}} \sum_x |x\rangle \sum_a \sqrt{p(a|x)}\,|a\rangle \otimes V_B |GHZ_{x,a}\rangle$$

($\frac{1}{\sqrt{3}}\sum_x |x\rangle$: Alice's msmt choice; $\sum_a \sqrt{p(a|x)}\,|a\rangle$: Alice's measurement outcome; $V_B|GHZ_{x,a}\rangle$: Bob's post-measured state)

- Alice then measures in comp. basis.

Since Bob knows V_B (he is cheating), we can assume they have

$$|\psi\rangle = \frac{1}{\sqrt{3}} \sum_x |x\rangle \sum_a \sqrt{p(a|x)}\,|a\rangle \otimes |GHZ_{x,a}\rangle$$

($\sqrt{p(a|x)}$: Uniform?)

This is the state they start out with in the "real" protocol (after self-testing).

In the "N finite" case, I am guessing we can assume we have something "close" to this.

Define $\rho_0'' = \underbrace{\mathrm{Tr}_B(|\Psi\rangle\langle\Psi|)}_{\chi_A} \otimes |+\rangle_R \otimes |??\rangle_S$

$\rho_0' = U \rho_0'' U^*$ to calculate S

on χ_{AR} $\rightarrow \rho_0 = \mathrm{Tr}_S(\rho_0)$ after S sent to Bob

G comes back.

on χ_{ARG} $\mathrm{Tr}_G(\rho_1) = \rho_0$

$\rho_1' = \rho_1 \otimes \frac{1}{\sqrt{2}} \sum_y |yy\rangle_{Y Y_2}$

Y_2 goes to Bob

$\rho_1'' = \mathrm{Tr}_{y_2}(\rho_1') = \rho_1 \otimes \frac{1}{2} I_Y$

D comes back

on χ_{ARGDY} $\mathrm{Tr}_D(\rho_2) = \rho_1 \otimes \frac{1}{2} I_Y$

Alice measures ρ_2 in computational Basis.

Aborts if ....
Accepts outcome 0 if ...
Accepts outcome 1 if ...

} Completely diagonal POVMs. Easier SDP!

$p_B^* =$ SDP: $\sup \langle \Pi_1, \beta_z \rangle$

$T_{F_D}(\beta_z) = \beta_1 \otimes \frac{1}{2} I_y$

$T_{F_S}(\beta_1) = \beta_0$

Tom: For finite N, can we have something similar to

$$\frac{1}{\sqrt{3}} \sum_x |x\rangle \sum_a \sqrt{p(a|x)}\, |a\rangle \otimes |GHZ_{xa}\rangle$$

in the protocol? Even if this is not the case, we just need that the probs are approximate as well as the post-measured states..