

## Rings – 1 round

**3v3**

$$\begin{aligned}
 & (e^{3i\gamma} (\cos^3(\beta) - i \sin^3(\beta)) (e^{3i\gamma} (\cos^3(\beta) - i \sin^3(\beta)) + e^{-i\gamma} (-3 \sin^2(\beta) \cos(\beta) + 3i \sin(\beta) \cos^2(\beta))) \\
 & + e^{-i\gamma} (-3 \sin^2(\beta) \cos(\beta) + 3i \sin(\beta) \cos^2(\beta)) (e^{3i\gamma} (-\sin^2(\beta) \cos(\beta) + i \sin(\beta) \cos^2(\beta)) \\
 & + e^{-i\gamma} (-i \sin^3(\beta) + \cos^3(\beta) + 2i \sin(\beta) \cos^2(\beta) - 2 \sin^2(\beta) \cos(\beta))) (e^{-3i\gamma} (\cos^3(\beta) \\
 & + i \sin^3(\beta)) (e^{-3i\gamma} (\cos^3(\beta) + i \sin^3(\beta)) + e^{i\gamma} (-3 \sin^2(\beta) \cos(\beta) - 3i \sin(\beta) \cos^2(\beta))) \\
 & + e^{i\gamma} (-3 \sin^2(\beta) \cos(\beta) - 3i \sin(\beta) \cos^2(\beta)) (e^{-3i\gamma} (-\sin^2(\beta) \cos(\beta) - i \sin(\beta) \cos^2(\beta)) \\
 & + e^{i\gamma} (i \sin^3(\beta) + \cos^3(\beta) - 2i \sin(\beta) \cos^2(\beta) - 2 \sin^2(\beta) \cos(\beta)))
 \end{aligned}$$

**p = 0.9999999999999957**

**3v1 2**

$$\begin{aligned}
 & (e^{3i\gamma} (-\sin^2(\beta) \cos(\beta) + i \sin(\beta) \cos^2(\beta)) (e^{3i\gamma} (\cos^3(\beta) - i \sin^3(\beta)) \\
 & + e^{-i\gamma} (-3 \sin^2(\beta) \cos(\beta) + 3i \sin(\beta) \cos^2(\beta))) + e^{-i\gamma} (-i \sin^3(\beta) + \cos^3(\beta) \\
 & + 2i \sin(\beta) \cos^2(\beta) - 2 \sin^2(\beta) \cos(\beta)) (e^{3i\gamma} (-\sin^2(\beta) \cos(\beta) + i \sin(\beta) \cos^2(\beta)) \\
 & + e^{-i\gamma} (-i \sin^3(\beta) + \cos^3(\beta) + 2i \sin(\beta) \cos^2(\beta) - 2 \sin^2(\beta) \cos(\beta))) (e^{-3i\gamma} (-\sin^2(\beta) \cos(\beta) \\
 & - i \sin(\beta) \cos^2(\beta)) (e^{-3i\gamma} (\cos^3(\beta) + i \sin^3(\beta)) + e^{i\gamma} (-3 \sin^2(\beta) \cos(\beta) - 3i \sin(\beta) \cos^2(\beta))) \\
 & + e^{i\gamma} (i \sin^3(\beta) + \cos^3(\beta) - 2i \sin(\beta) \cos^2(\beta) \\
 & - 2 \sin^2(\beta) \cos(\beta)) (e^{-3i\gamma} (-\sin^2(\beta) \cos(\beta) - i \sin(\beta) \cos^2(\beta)) \\
 & + e^{i\gamma} (i \sin^3(\beta) + \cos^3(\beta) - 2i \sin(\beta) \cos^2(\beta) - 2 \sin^2(\beta) \cos(\beta)))
 \end{aligned}$$

**p = 0.9999999999999936**

**4v4**

$$\begin{aligned}
 & (-4 \sin^2(\beta) \cos^2(\beta) (-2e^{-4i\gamma} \sin^2(\beta) \cos^2(\beta) - 2e^{4i\gamma} \sin^2(\beta) \cos^2(\beta) + \sin^4(\beta) + \cos^4(\beta) + 4i \sin(\beta) \cos^3(\beta) \\
 & - 2 \sin^2(\beta) \cos^2(\beta) - 4i \sin^3(\beta) \cos(\beta)) - 2e^{-4i\gamma} \sin^2(\beta) \cos^2(\beta) (e^{-4i\gamma} (\sin^4(\beta) + \cos^4(\beta)) \\
 & - 2e^{4i\gamma} \sin^2(\beta) \cos^2(\beta) + 4i \sin(\beta) \cos^3(\beta) - 4 \sin^2(\beta) \cos^2(\beta) - 4i \sin^3(\beta) \cos(\beta)) \\
 & + (4i \sin(\beta) \cos^3(\beta) - 4i \sin^3(\beta) \cos(\beta)) (e^{-4i\gamma} (i \sin(\beta) \cos^3(\beta) - i \sin^3(\beta) \cos(\beta)) \\
 & + e^{4i\gamma} (i \sin(\beta) \cos^3(\beta) - i \sin^3(\beta) \cos(\beta)) + \sin^4(\beta) + \cos^4(\beta) + 2i \sin(\beta) \cos^3(\beta) - 6 \sin^2(\beta) \cos^2(\beta) \\
 & - 2i \sin^3(\beta) \cos(\beta)) + e^{4i\gamma} (\sin^4(\beta) + \cos^4(\beta)) (e^{4i\gamma} (\sin^4(\beta) + \cos^4(\beta)) - 2e^{-4i\gamma} \sin^2(\beta) \cos^2(\beta) \\
 & + 4i \sin(\beta) \cos^3(\beta) - 4 \sin^2(\beta) \cos^2(\beta) - 4i \sin^3(\beta) \cos(\beta)) (-4 \sin^2(\beta) \cos^2(\beta) (-2e^{-4i\gamma} \sin^2(\beta) \cos^2(\beta) \\
 & - 2e^{4i\gamma} \sin^2(\beta) \cos^2(\beta) + \sin^4(\beta) + \cos^4(\beta) - 4i \sin(\beta) \cos^3(\beta) - 2 \sin^2(\beta) \cos^2(\beta) + 4i \sin^3(\beta) \cos(\beta)) \\
 & - 2e^{4i\gamma} \sin^2(\beta) \cos^2(\beta) (e^{4i\gamma} (\sin^4(\beta) + \cos^4(\beta)) - 2e^{-4i\gamma} \sin^2(\beta) \cos^2(\beta) - 4i \sin(\beta) \cos^3(\beta) - 4 \sin^2(\beta) \cos^2(\beta) \\
 & + 4i \sin^3(\beta) \cos(\beta)) + (4i \sin^3(\beta) \cos(\beta) - 4i \sin(\beta) \cos^3(\beta)) (e^{-4i\gamma} (i \sin^3(\beta) \cos(\beta) - i \sin(\beta) \cos^3(\beta)) \\
 & + e^{4i\gamma} (i \sin^3(\beta) \cos(\beta) - i \sin(\beta) \cos^3(\beta)) + \sin^4(\beta) + \cos^4(\beta) - 2i \sin(\beta) \cos^3(\beta) \\
 & - 6 \sin^2(\beta) \cos^2(\beta) + 2i \sin^3(\beta) \cos(\beta)) + e^{-4i\gamma} (\sin^4(\beta) + \cos^4(\beta)) (e^{-4i\gamma} (\sin^4(\beta) + \cos^4(\beta)) \\
 & - 2e^{4i\gamma} \sin^2(\beta) \cos^2(\beta) - 4i \sin(\beta) \cos^3(\beta) - 4 \sin^2(\beta) \cos^2(\beta) + 4i \sin^3(\beta) \cos(\beta))
 \end{aligned}$$

**p = 0.9844057710087093**





























$$p = 0.2845242037151404$$





$$p = 0.3855649540684987$$



$$p = 0.3517160987716251$$



$$p = 0.3111102052919139$$



$$p = 0.3987616770060151$$





$$p = 0.22926040408494397$$



$$p = 0.24572465311517278$$



$$p = 0.35546774787757035$$





$$p = 0.720129616089108$$



$$p = 0.21388444773258236$$



$$p = 0.20110445623132936$$



$$p = 0.29405126138548393$$





$$p = 0.10853161262190925$$



$$p = 0.2707151609562636$$



$$p = 0.0939027856900529$$



$$p = 0.17893278529612658$$





$$p = 0.311428469660244$$



$$p = 0.12120384621725261$$



$$p = 0.3200767897594818$$



$$p = 0.20110445623132991$$





$$p = 0.09390278569005299$$



$$p = 0.15018888599129698$$



$$p = 0.2707151609562656$$



$$p = 0.2940512613854841$$





$$p = 0.3114284696602445$$



$$p = 0.1230507213760899$$



$$p = 0.2138844477325827$$