Minimum entangled state dimension required for pseudo-telepathy. (English summary)

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A “pseudo-telepathy” game is a game consisting of questions given to separated players who must give answers satisfying certain rules, which cannot always be satisfied if the players only share classical information, whereas they can always be satisfied if they share a quantum entangled state. Quantum pseudo-telepathy is a particular type of entanglement-assisted reduction of communication complexity where no classical communication whatsoever is allowed between the players. Any “all-versus-nothing” proof of Bell’s theorem admits an interpretation as a pseudo-telepathy game. In this paper, it is shown that any two-player pseudo-telepathy game requires the players to share an entangled state of dimension at least $3 \times 3$, and that any pseudo-telepathy game requires an entangled state of dimension at least $2 \times 2 \times 2$.

Reviewed by Adán Cabello

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