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Quantum controlled paths for perfect discrimination of no-signalling channels GIULIO CHRIBELLA, Perimeter Institute — A no-signalling channel transforming systems in Alice's and Bob's local laboratories is compatible with two different causal structures: one where Alice's output can be sent to Bob's input and another where Bob's output can be sent to Alice's input. I show that a quantum superposition of circuits operating within these two causal structures enables the perfect discrimination between two no-signalling channels that could not be perfectly distinguished by any ordinary circuit [1]. Such a quantum superposition can be in principle achieved by introducing a qubit that controls the path followed by quantum systems, routing them to different ports of the given no-signalling channel.

[1] G. Chiribella, *Perfect discrimination of no-signalling channels via quantum superposition of causal structures*, arXiv:1109.5154.

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