Review of: "What connects entangled photons?"

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The manuscript by Eugen Muchowski presents a theoretical study focused on answering the question, "What connects entangled photons?" The author begins by presenting four assumptions of the model. Subsequently, the author demonstrates that quantum states with predefined polarization states adhere to the predictions of Quantum Mechanics, such as the violation of Bell's inequality. The author applies the proposed model to entanglement swapping and teleportation, highlighting its agreement with measured Bell's States. As a conclusion in response to the title, the author suggests that the conservation of spin angular momentum is what connects entangled pairs.

Overall, the theoretical model is presented in a clear and comprehensible manner. However, from an experimental perspective, certain questions remain.

1. Dholakia et al. have demonstrated that the conservation of interaction spin-angular momentum through a nonlinear crystal is weak in terms of efficiency. Therefore, how can photons generated through a nonlinear crystal become entangled with a high visibility through the conservation of their spin angular momentum?
2. It is intriguing that the author, through a local model, is able to present non-local results as predicted by Quantum Mechanics theory. Would it be possible for the author to propose an experimental setup that could further validate and enhance their theory? It is worth noting that the EPR proposition for hidden parameters has not yet been supported by experimental results.