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**TITLE:** Limits of spin coherent states via entanglement and distinguishability".

**ABSTRACT:**

We trace the resistance to entanglement generation of spin coherent states when passed through a beam splitter as we vary  $S$  through  $S=1/2 \rightarrow \infty$ . In the infinite  $S$  limit the spin coherent states are equivalent to the high amplitude limit of the optical coherent states. These states generate no entanglement and are completely distinguishable. This transition is discussed in terms of the classicality of the states. The decline of the generated entanglement, and in this sense increase in classicality with  $S$ , is very slow and dependent on the amplitude  $|z|$  of the state. Surprisingly we find that, for  $|z| > 1$ , there is an initial increase in entanglement followed by an extremely gradual decline to zero. Other aspects of classicality are also discussed over the transition in  $S$ , including the distinguishability, which decreases quickly and monotonically. We illustrate the distinguishability of spin coherent states in a novel manner using the representation of Majorana."