

# **Faster-than-light signalling and the rotating-wave approximation**

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## **Abstract**

We present new results on the causality violations introduced by the rotating wave approximation commonly used in quantum optics. We find that the causality violations and faster-than-light signalling induced by the approximation have fat tails: they are polynomially decaying with the distance from the light-cone of an emitter. Furthermore, we also show that the fundamental problems with the incompatibility between the approximation and relativity are not cured even in the long interaction time regime (where the approximation is often taken). This renders the approximation unsuitable for any regime where we are concerned about relativity and information transmission via the electromagnetic field.