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Pulse dynamics for the optical analogue of Hawking radiation

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The optical analogue of the Hawking radiation is based on the interaction between a pump and a probe through the optical Kerr effect. The phase-matching condition has been obtained previously by considering the conservation of energy in a frame co-moving with the pump. However, the origin of this interaction in nonlinear optics was not clear. In this work, we derive the conditions for the interaction of positive and negative frequencies, including analogue Hawking radiation, based on the method by *Skryabin, Yulin* and a similar explanation for the negative resonant radiation by *Biancalana et al.*

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