

# **Self-modulation and radiation emission of a long relativistic charged-particle beam interacting with a pump-driven plasma wave**

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## **Abstract**

The self-modulation originated by the plasma wake field (PWF) excitation, induced by a long relativistic charged-particle beam travelling in a plasma, while interacting with a pump-driven plasma wave, is investigated in both overdense and underdense regimes. Due to the interplay between the PWF-based beam-plasma interaction, the beam spreading (emittance) and the interaction with the pump-driven plasma wave, the beam executes betatron oscillations. An analysis of the betatron radiation emission process is carried out and the possibility to generate coherent X-rays is explored.