

**Solitary Waves in Particle Beams**<sup>\*</sup>, J. BISOGNANO,  
CEBAF - Since space charge waves on a particle beam exhibit both dispersive and nonlinear character, solitary waves or solitons are possible. Dispersive, nonlinear wave propagation in high brightness beams is discussed, and exact longitudinal solitary wave propagation is found for certain transverse distributions. Scaling laws are presented to explore likely parameters where this phenomenon may be observed in realizable beams. The potential for solitary-wave behaviour for other beam self-interactions such as wakefields is discussed.

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