

# Francesco Ruggiero

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- Theoretical Aspects of Some Collective Instabilities in High Energy Storage Rings

THEORETICAL ASPECTS  
OF SOME COLLECTIVE INSTABILITIES  
IN HIGH-ENERGY PARTICLE STORAGE RINGS

Francesco Ruggiero

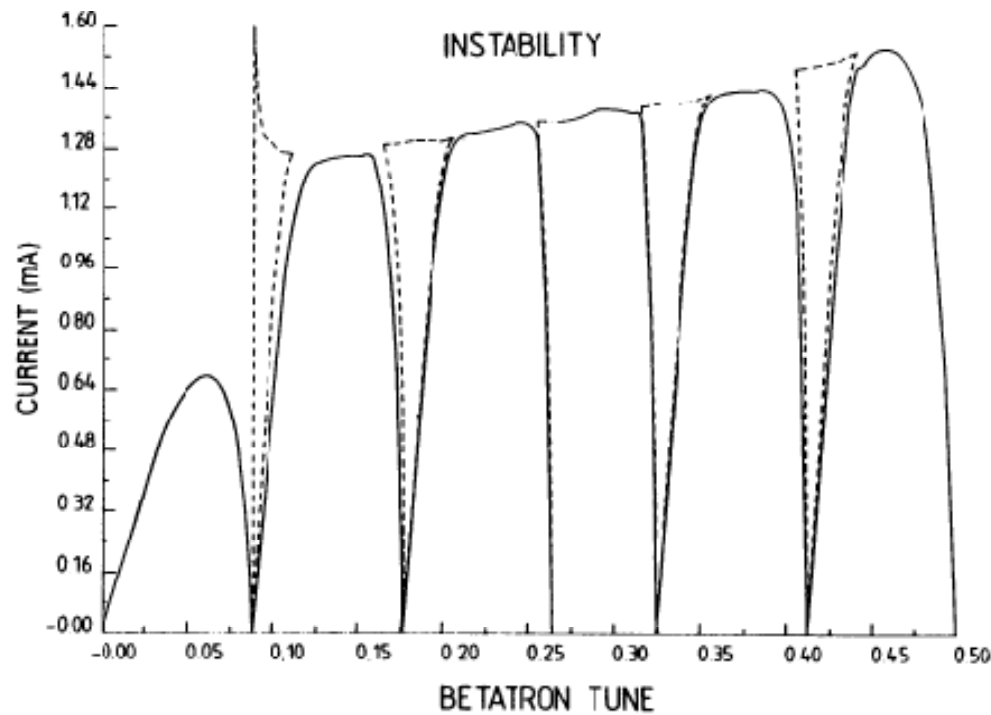
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CONTENTS

GENERAL INTRODUCTION	1
<b>Part 1: Unified Hamiltonian Approach to Single-Particle Dynamics</b>	
1.1 INTRODUCTION	3
1.2 REFERENCE ORBIT AND SYNCHRONOUS FRAME	4
1.3 NORMAL MODES OF OSCILLATION AROUND THE REFERENCE ORBIT	7
1.4 BETATRON AND SYNCHROTRON INVARIANTS	9
1.5 THE SMOOTH APPROXIMATION	14
1.6 DAMPING AND NOISE IN ELECTRON STORAGE RINGS	19
<b>Part 2: Transverse Mode Coupling Instability due to Localized Structures</b>	
2.1 INTRODUCTION	25
2.2 VLASOV EQUATION AND COLLECTIVE FORCE	26
2.3 THE INTEGRAL EQUATION	29
2.4 BUNCHED BEAMS AND FOURIER ANALYSIS	30
2.5 GAUSSIAN BUNCHES	32
2.6 RESULTS OF THE NUMERICAL ANALYSIS	35
2.7 CONCLUSIONS	39
<b>Part 3: Beam-Beam Interaction and Renormalized Fokker-Planck Equation</b>	
3.1 INTRODUCTION	42
3.2 THE BEAM-BEAM INTERACTION IN ELECTRON STORAGE RINGS	44
3.2.1 The Fokker-Planck Equation for Betatron Oscillations	44
3.2.2 The Effect of the Beam-Beam Interaction	46
3.2.3 Qualitative Interpretation of the Role of the Noise	47
3.3 THE RENORMALIZED FOKKER-PLANCK EQUATION	49
3.4 THE EFFECT OF THE WHITE NOISE ON THE RESONANCES	53

# Threshold Current vs tune

$$I_{\text{th}} = 2\pi \frac{\nu_s (E/e)}{\beta (\omega_r/\omega_0) (R_{\perp}/Q)} F(\sigma)$$



RADIATION REACTION EFFECTS IN HIGH ENERGY ELECTRON-POSITRON LINEAR COLLIDERS

C. Pellegrini\*) and F. Ruggiero

ABSTRACT

We discuss the electromagnetic interaction of electron and positron bunches at the focal point of a linear collider. Using classical electrodynamics and including the effect of the radiation reaction force, which plays a dominant role in the energy loss of the particles and influences their trajectories, we derive an expression for the beamstrahlung parameter which is consistent with energy conservation. In the limit of small losses, our results coincide with those obtained previously. We also discuss the conditions for which the classical description is no more valid and a quantum mechanical calculation is needed.