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Parameters of an RF cycle for Au79+ and p

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U.S. Department of Energy
USDOE Office of Science (SC)

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RHIC Project

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RHIC/RF Technical Note No. 5

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Abstract

A longitudinal emittance 0.30 eVs/u is assumed. Major parameters (bunch length, bucket area, bucket length, synchrotron frequency *etc.*) of gold and proton cyles are calculated and plotted throughout the acceleration cycle.

1 Introduction

The cycle used here starts from a few second before acceleration, ends prior the beam being transferred from accelerating cavities to storage cavities. The gold beam goes through transition, and experiences a γ_{tr} jump. The proton does not go through transition. Since the nominal matching voltage for proton is too low, a bunch rotation is assumed and the bunch length is reduced by one half in *AGS*.

The ramp between two plateau is connected by a quarter period of *sine* wave form. For instance, the V_{rf} is ramped up from matching voltage to acceleration volts or ramped down to make a bunch rotation; $\hat{B}$ is ramped from zero to its maximum value.

Note that excluding the region of γ_{tr} jump, γ_{tr} is taken as 23.6. Small changes in the value of γ_{tr} have little effects on the overall results.

2 Au^{79+} cycle

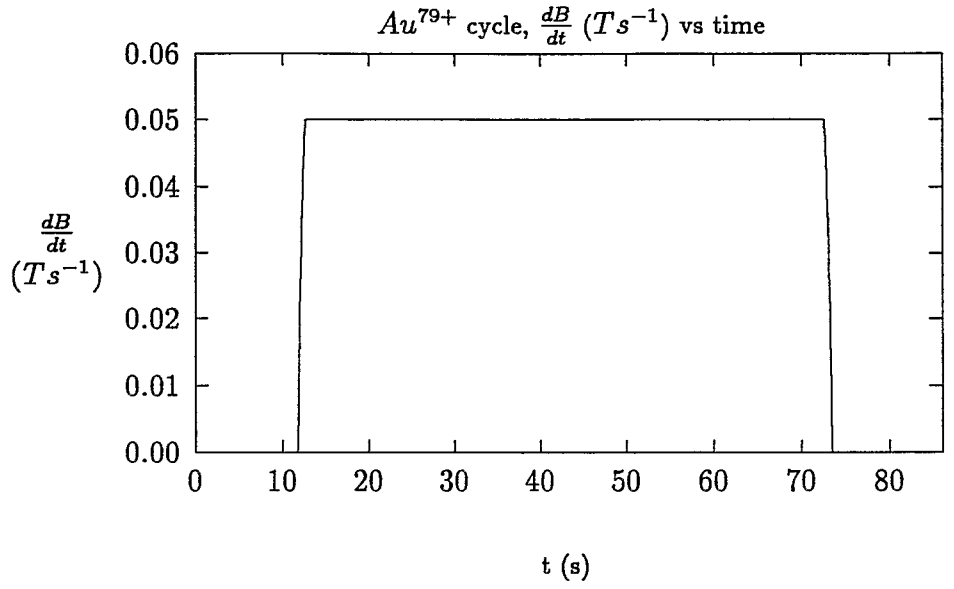
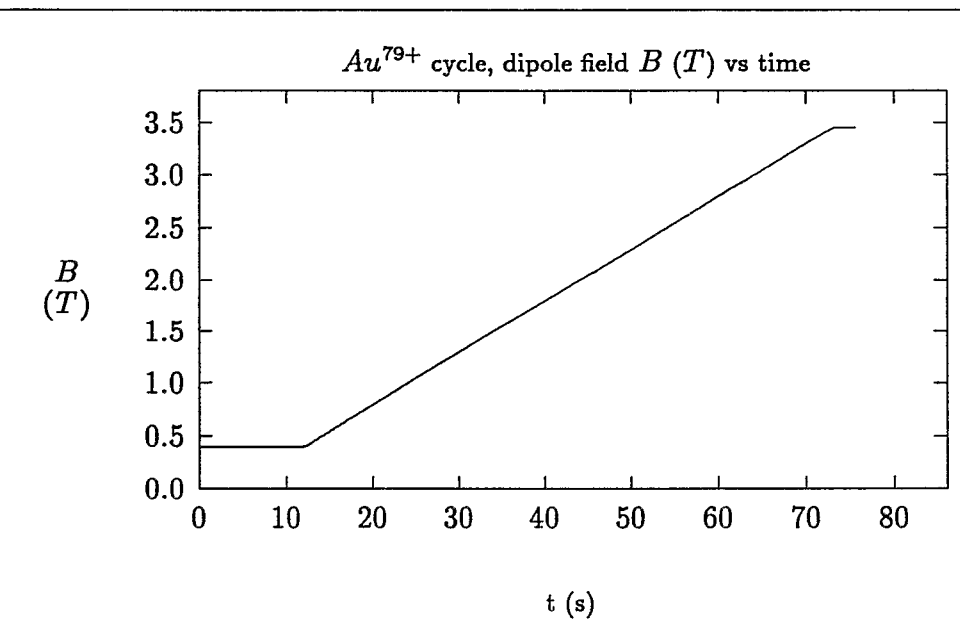


Figure 1:



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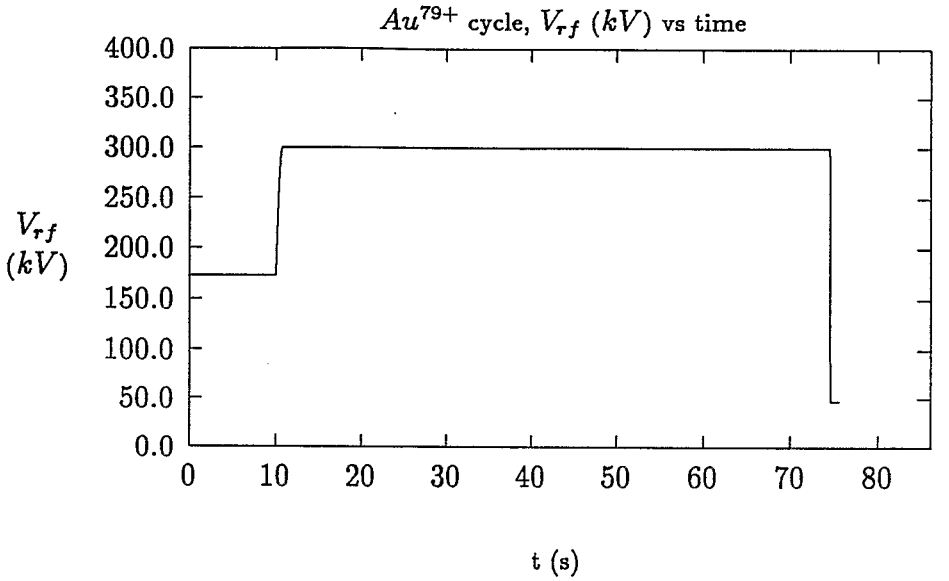

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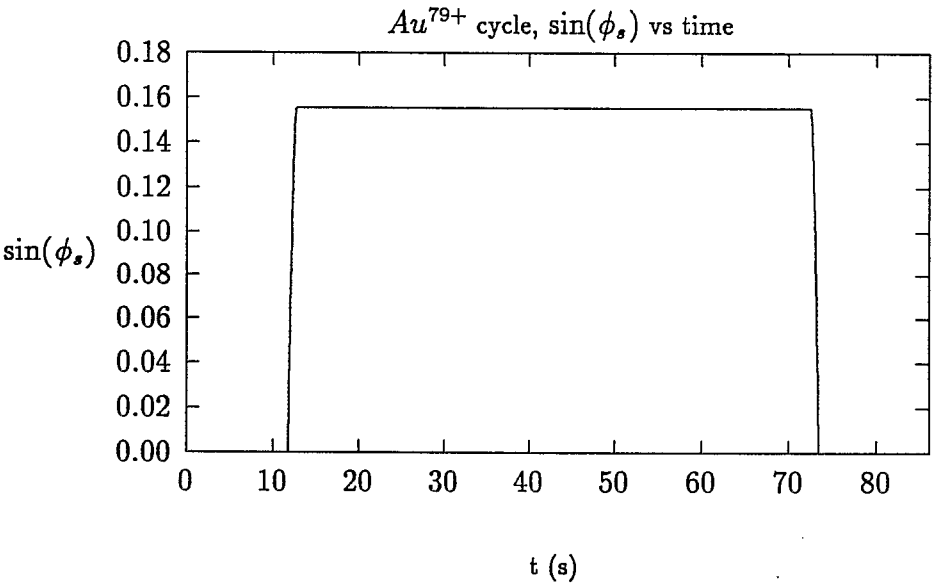

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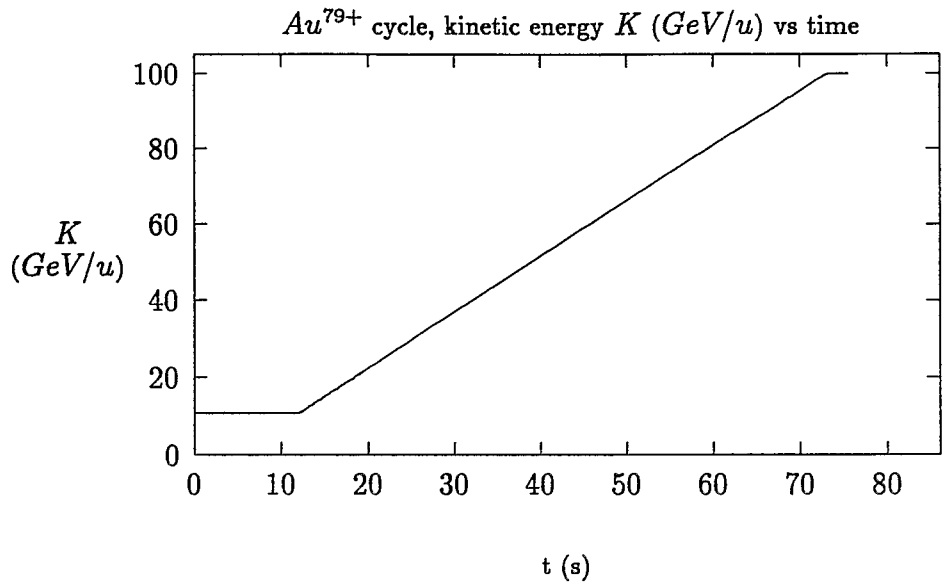

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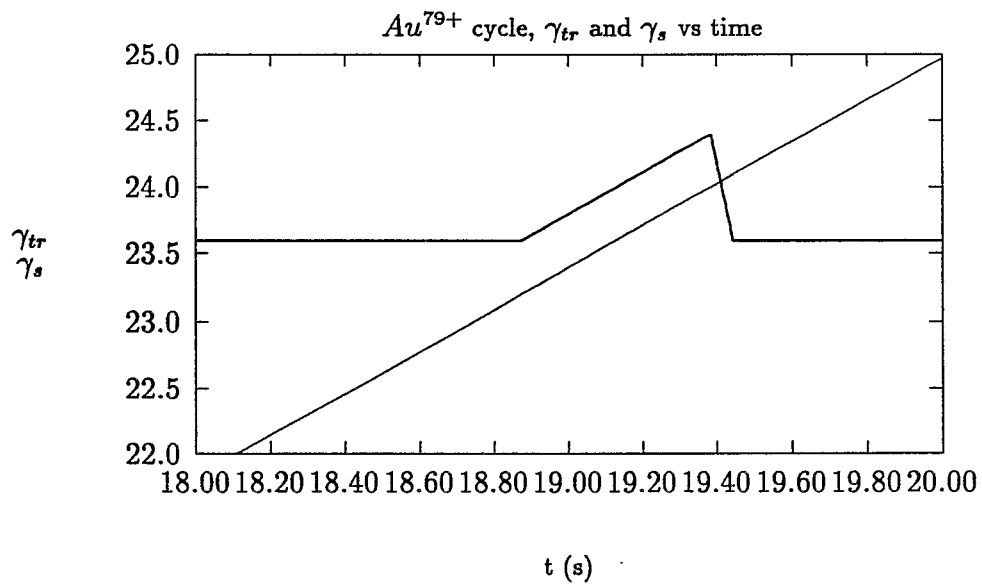

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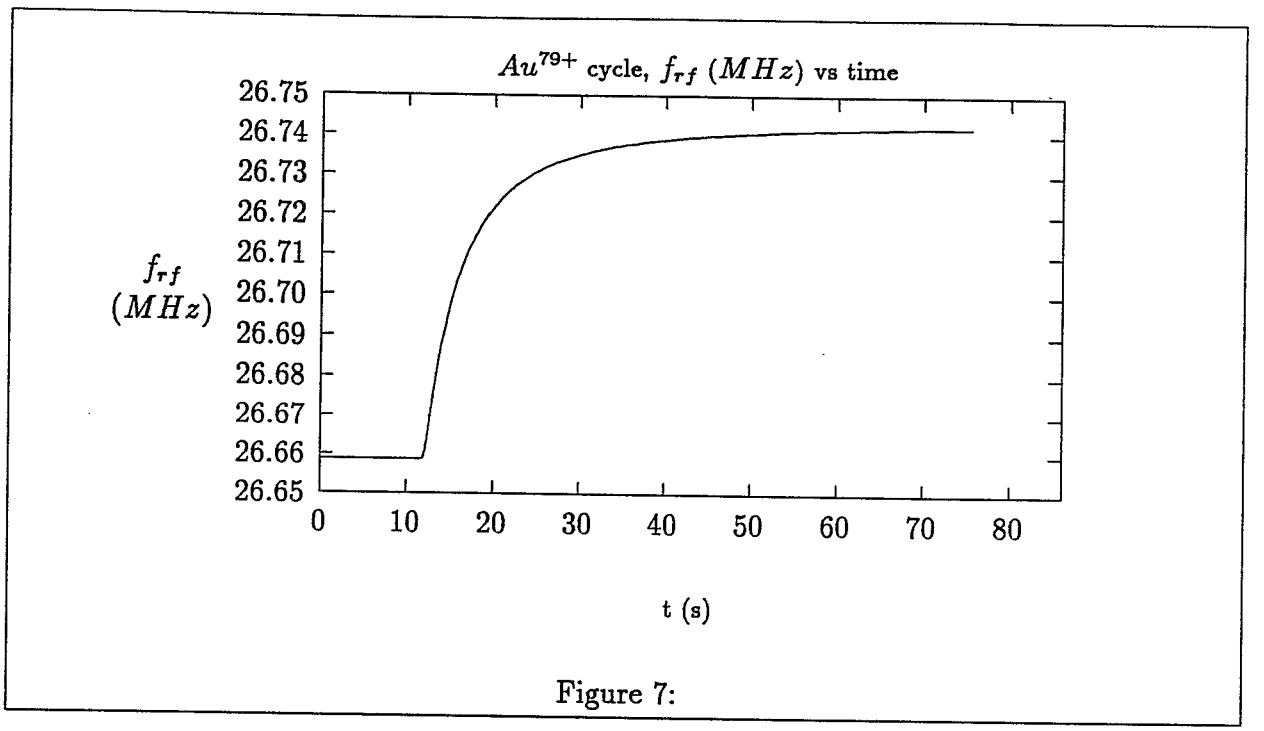

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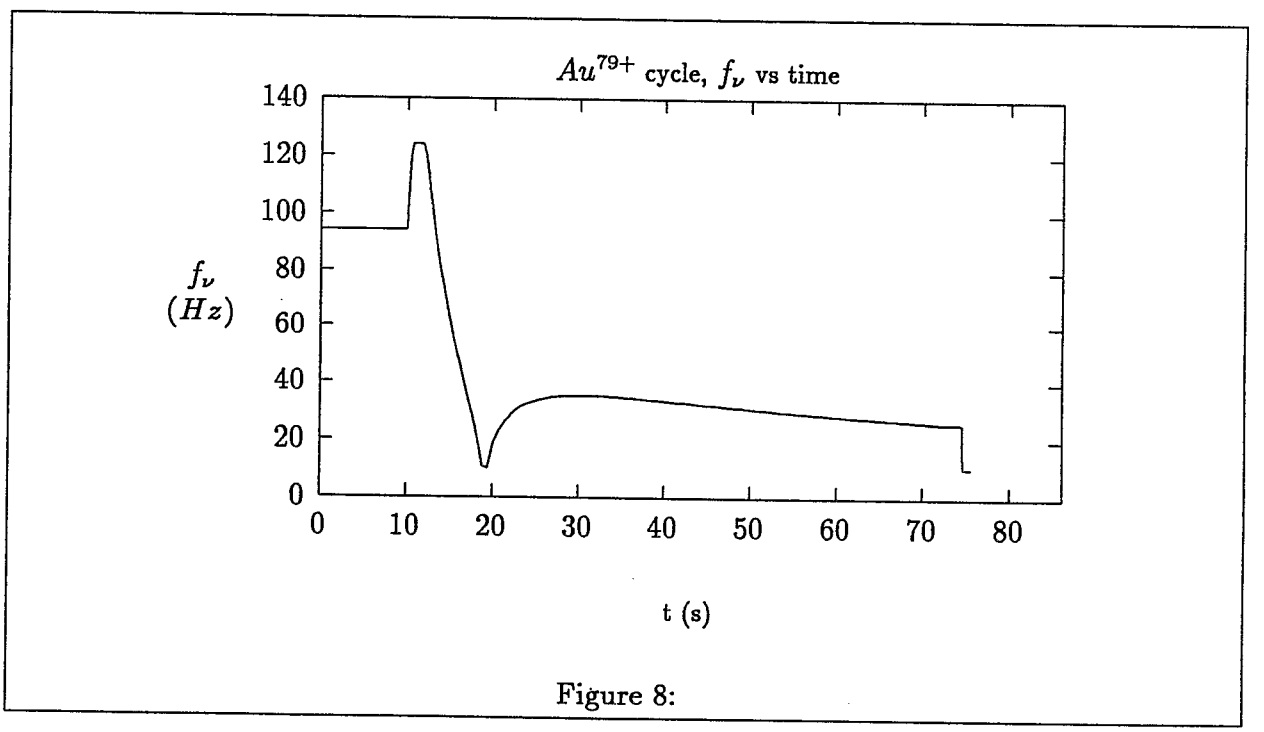

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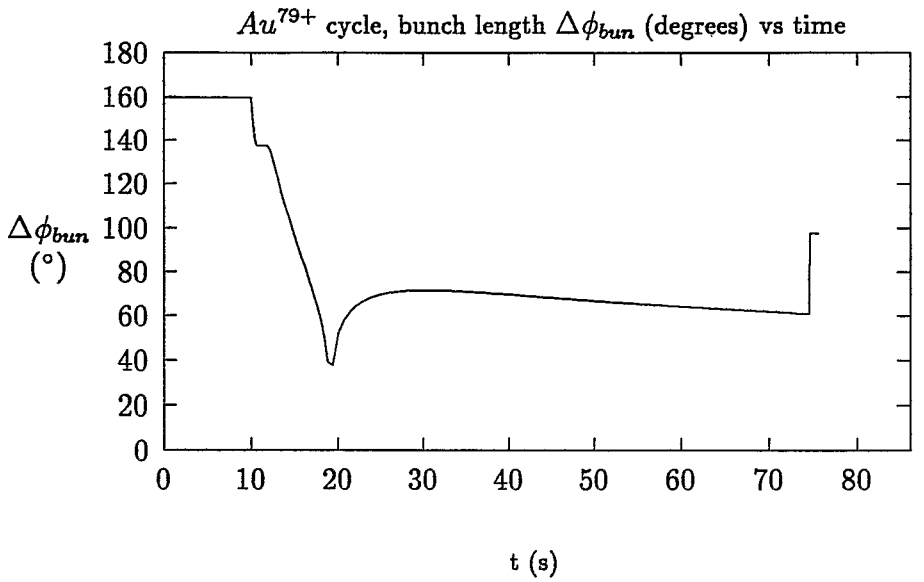

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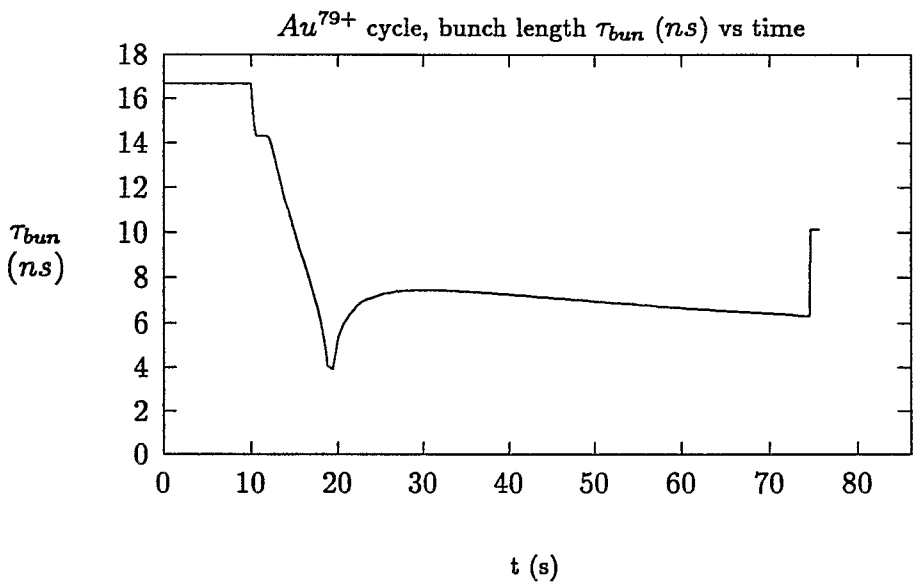

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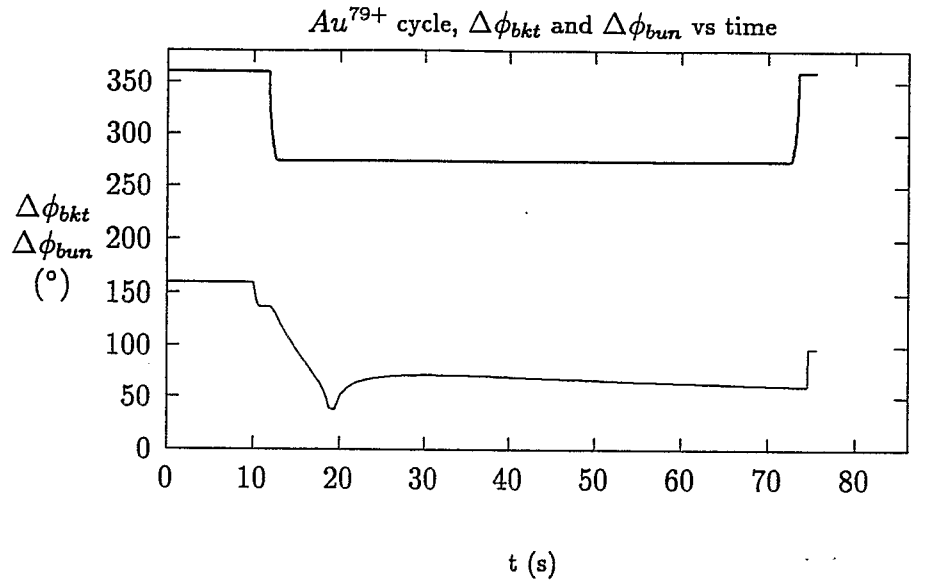

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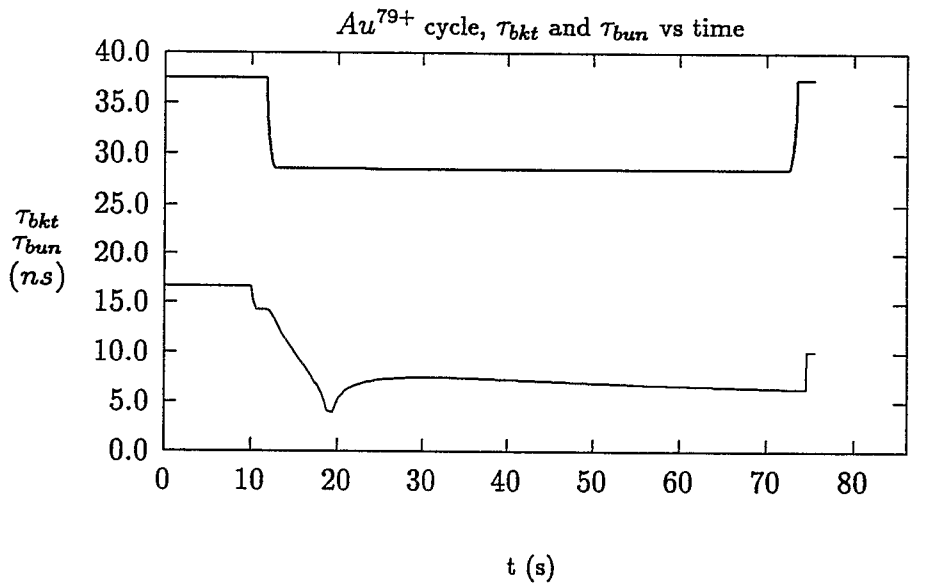

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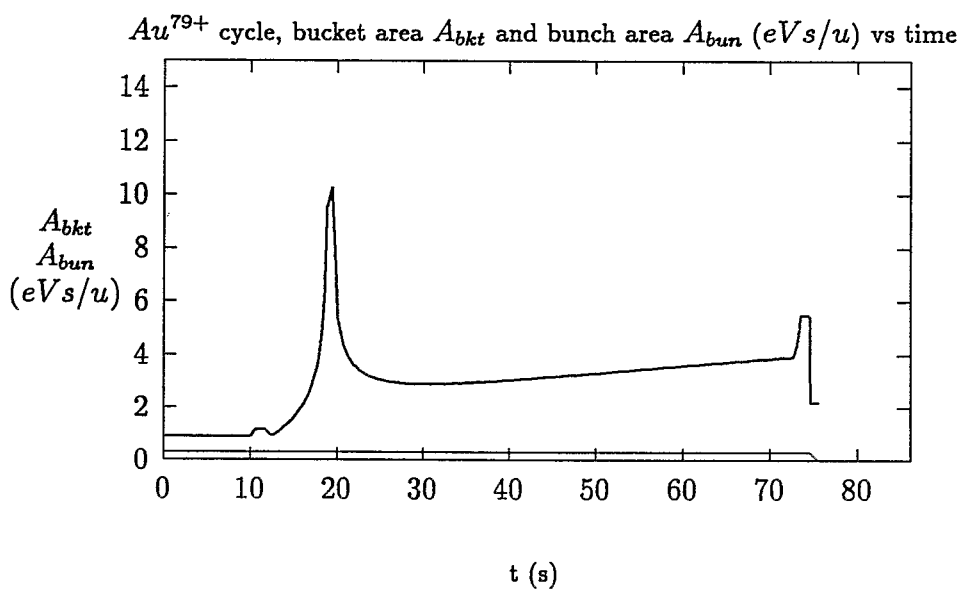
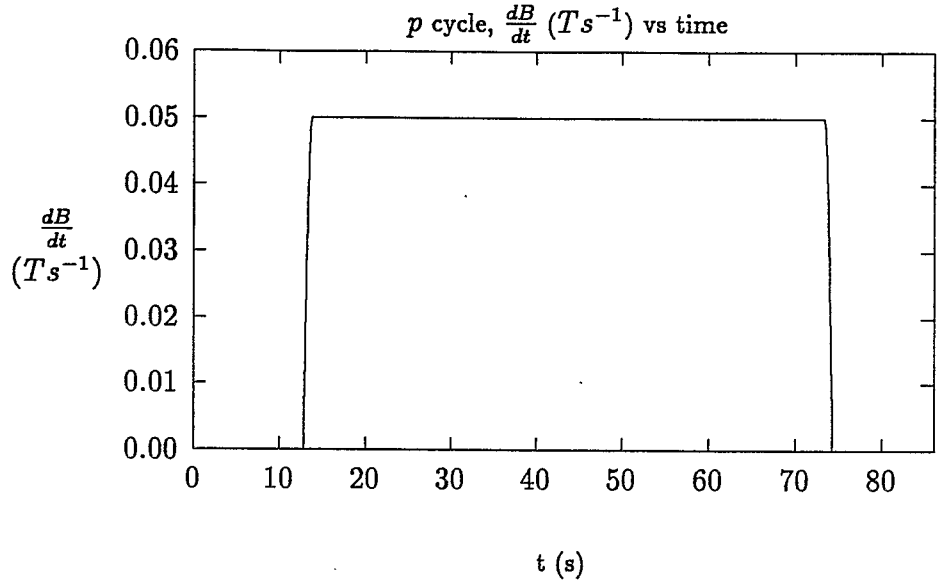

Au^{79+} cycle, bucket area A_{bkt} and bunch area A_{bun} (eVs/u) vs time
A_{bkt}
A_{bun}
(eVs/u)
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
t (s)

Figure 13:

3 p cycle



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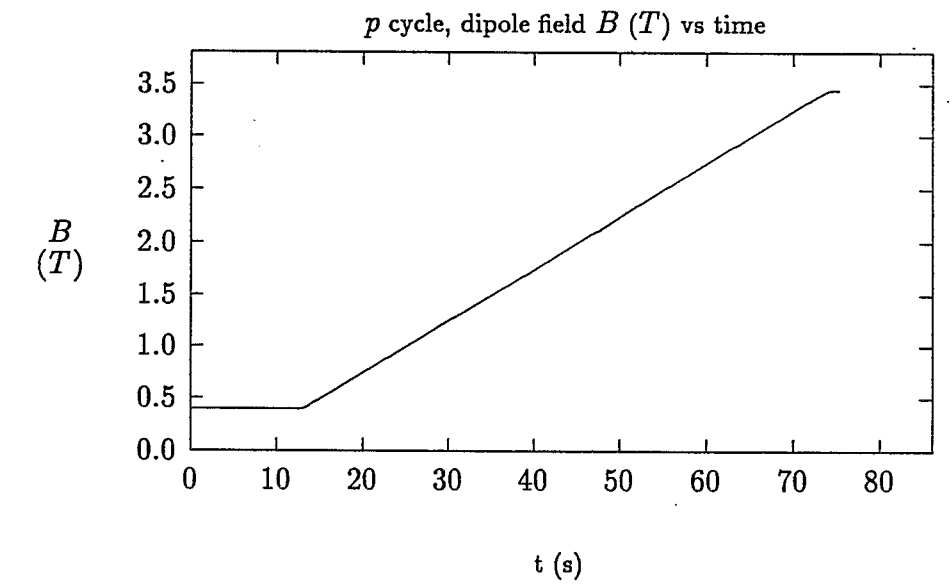

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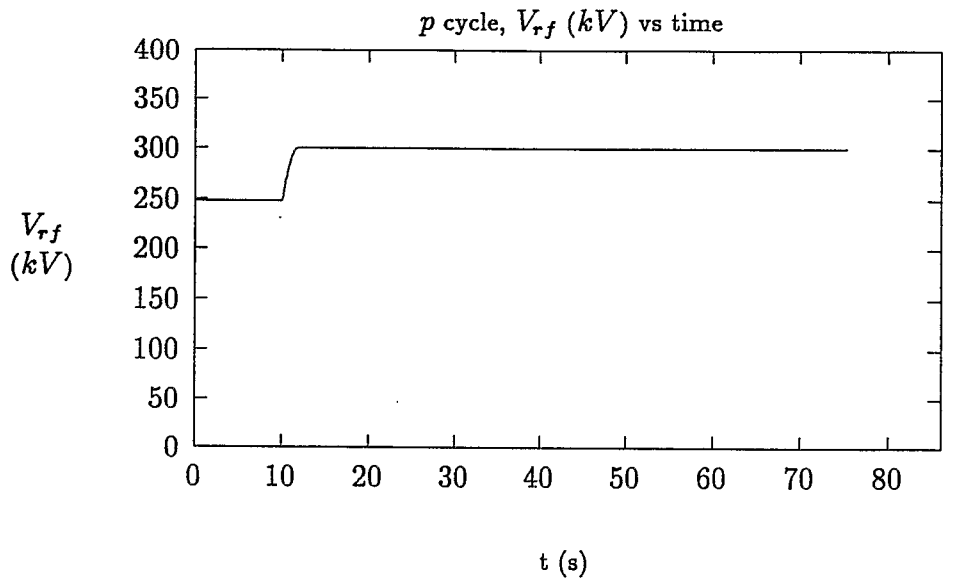

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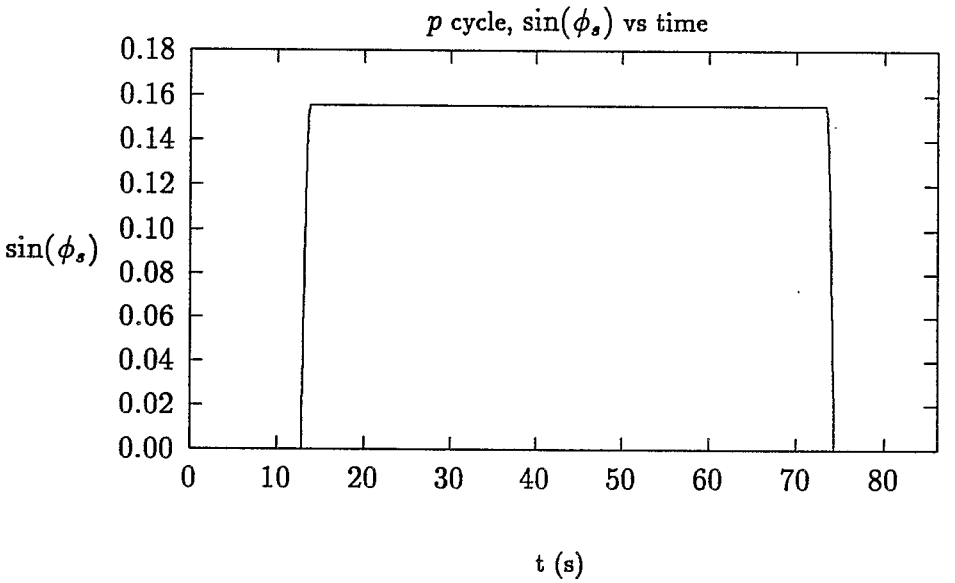

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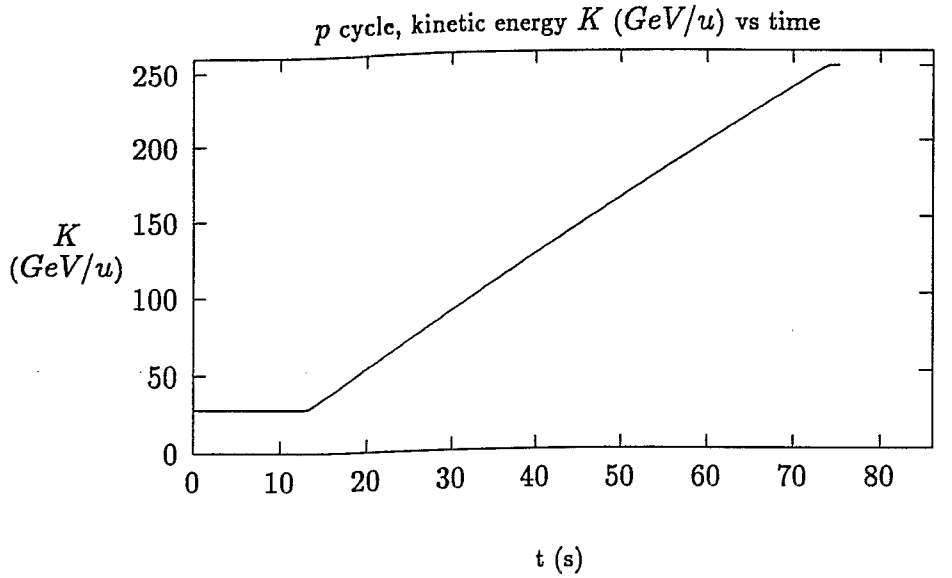

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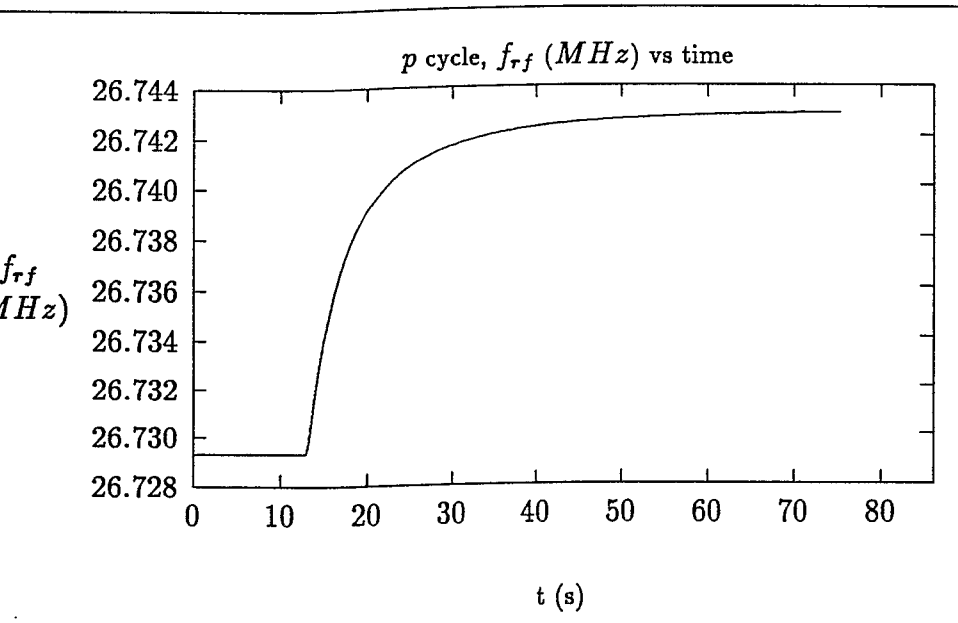

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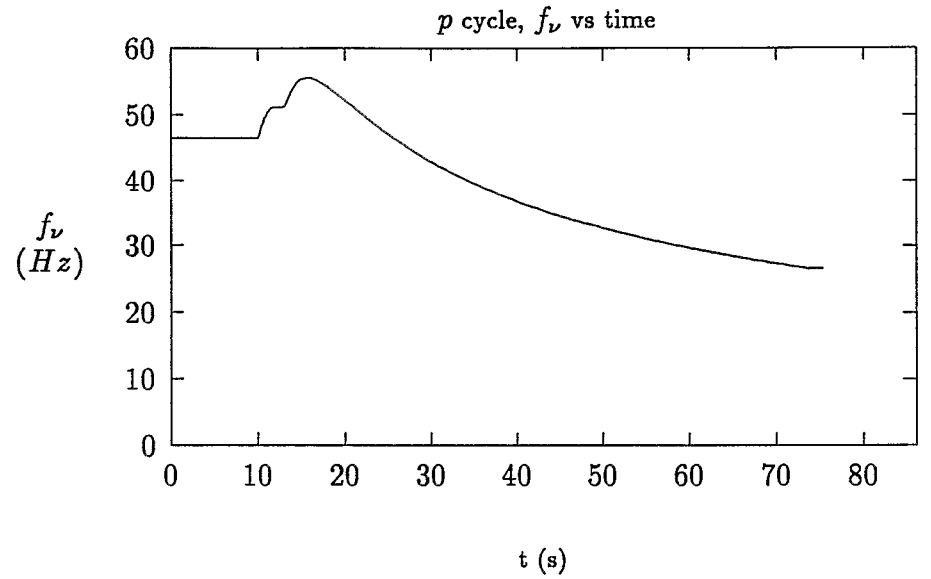

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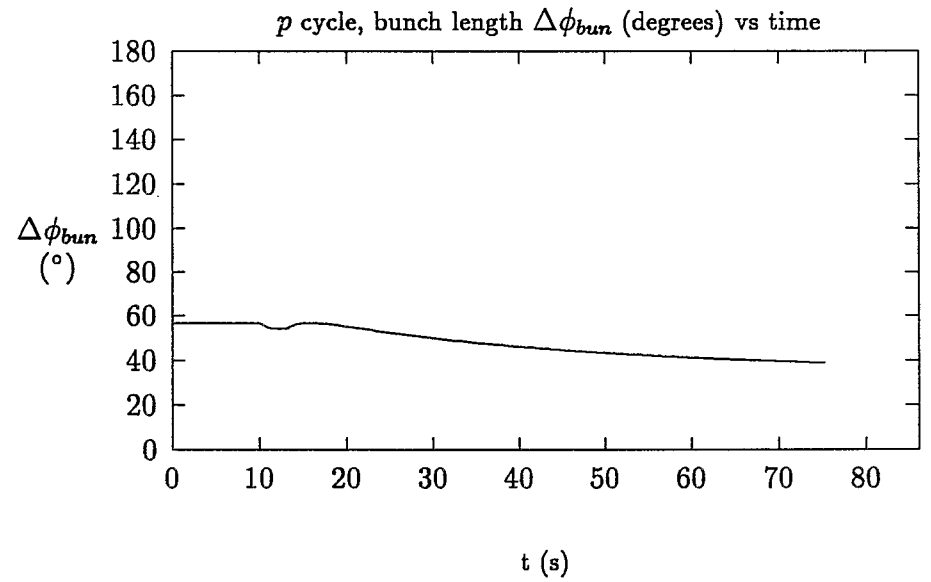

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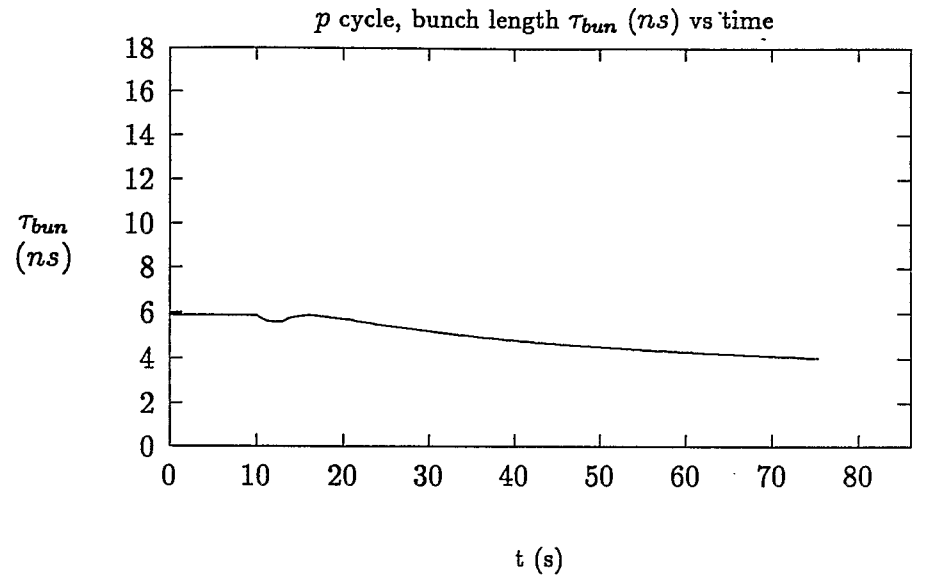

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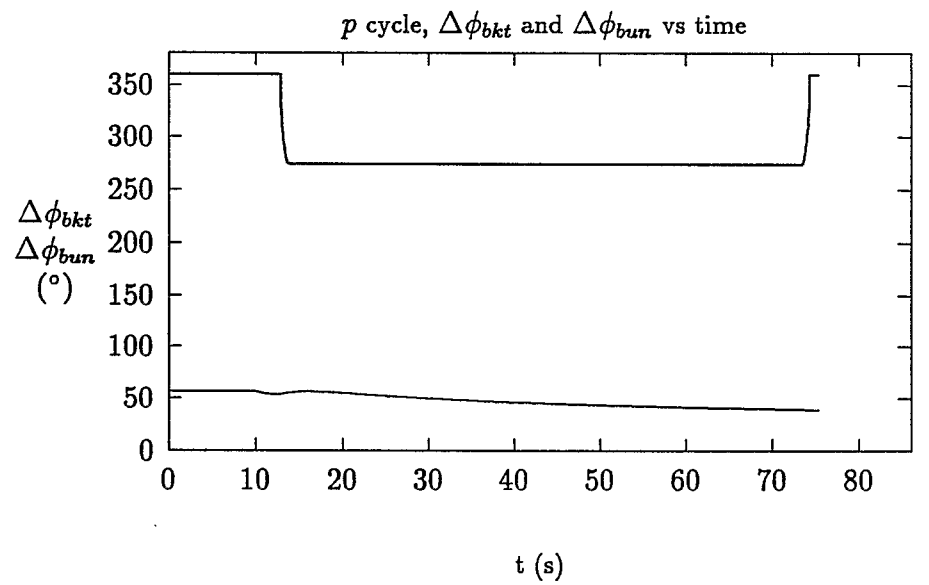

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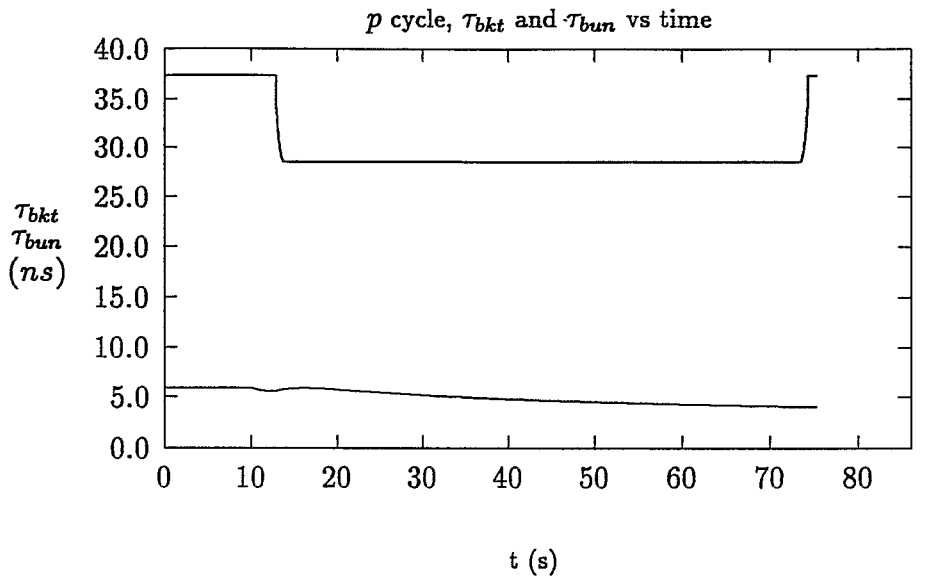

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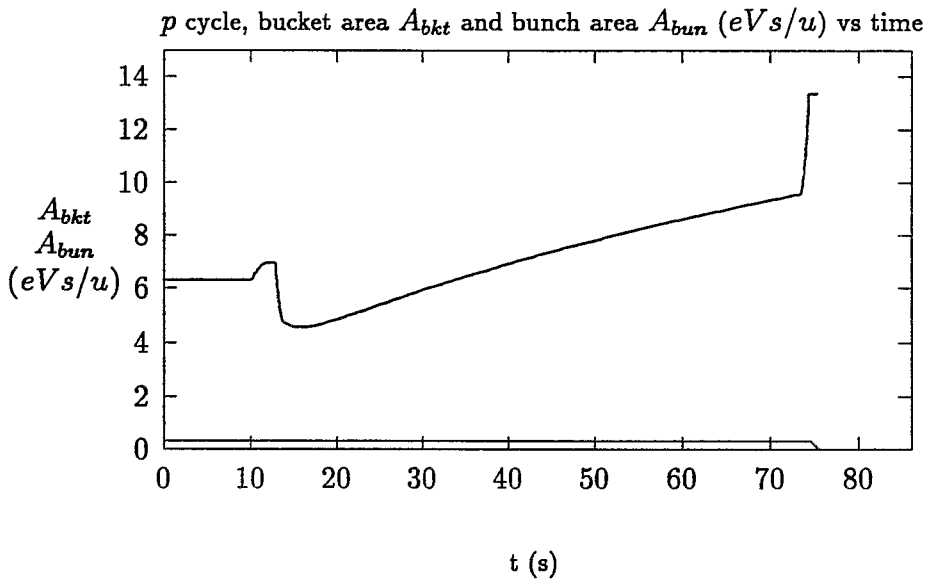

Figure 25: