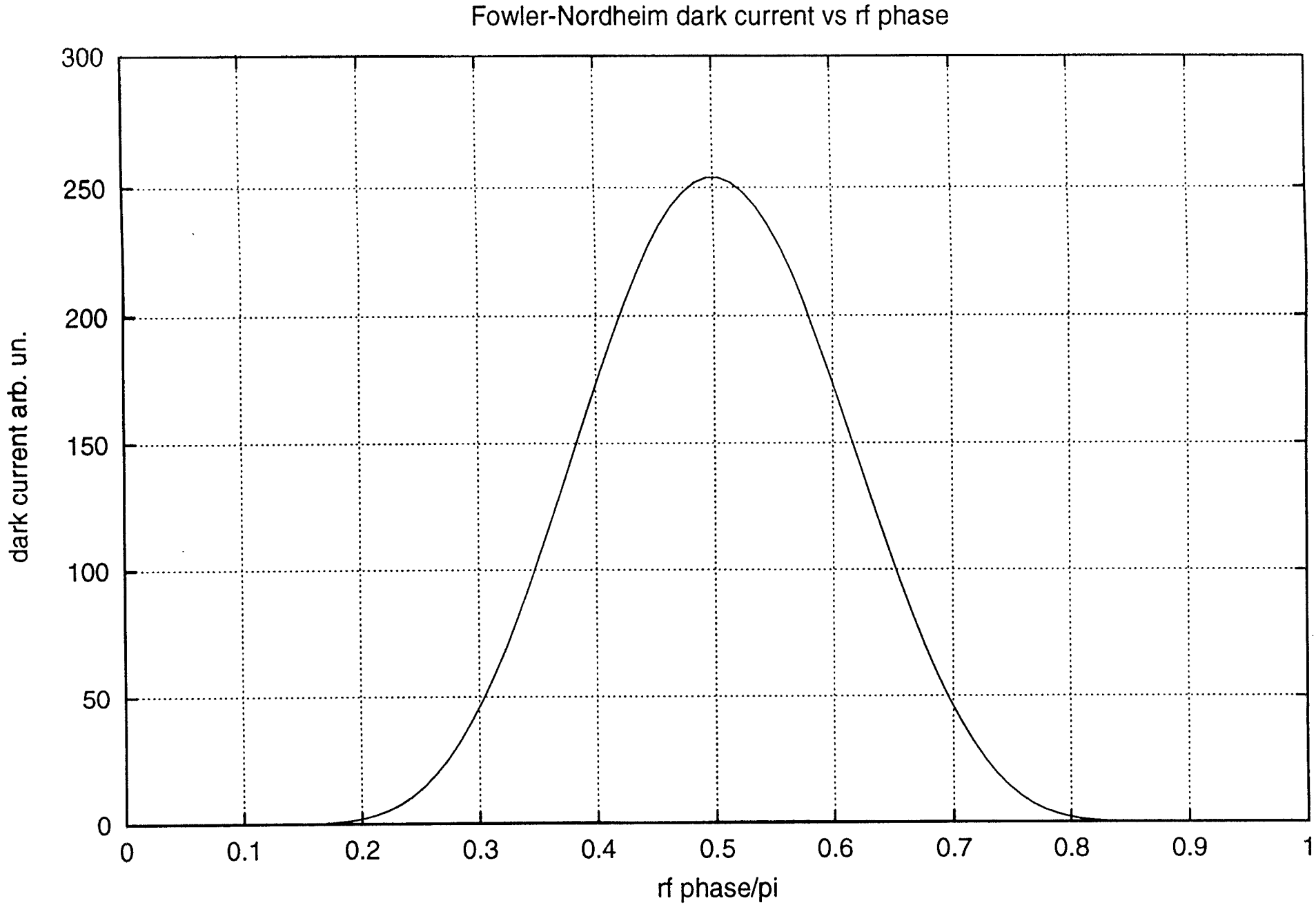
Fowler-Nordheim

$$I \propto \beta^2 E^2 \exp\left[\frac{-c}{\beta E}\right]$$

$$E = E_0 \cdot \sin(\omega t)$$


Fowler-Nordheim dark current vs rf phase
dark current arb. un.
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
rf phase/pi

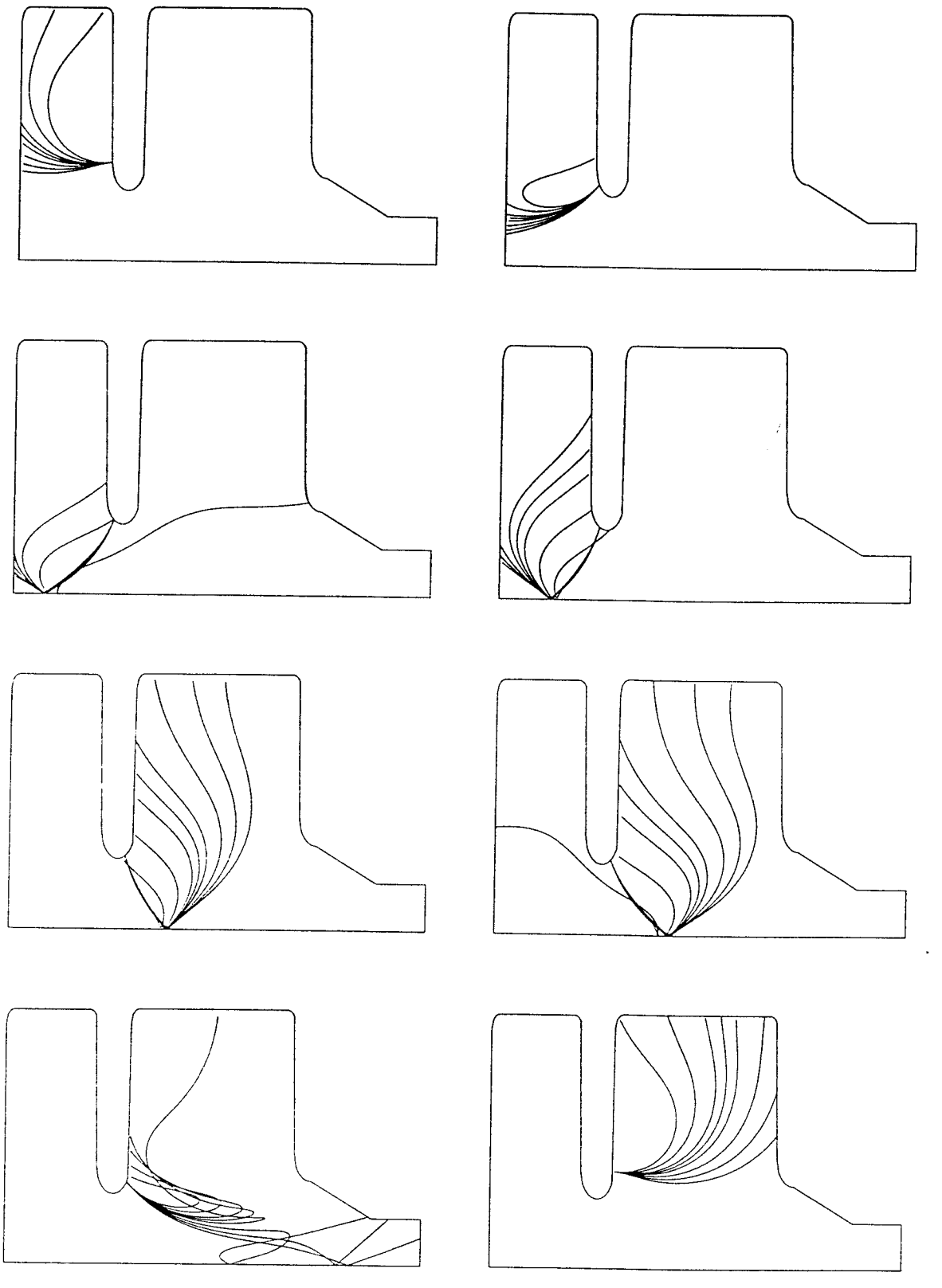


Figure 2 Dark current emission from the middle iris of the rf gun. Gradient at the cathode: 40 MV/m, Solenoid off.

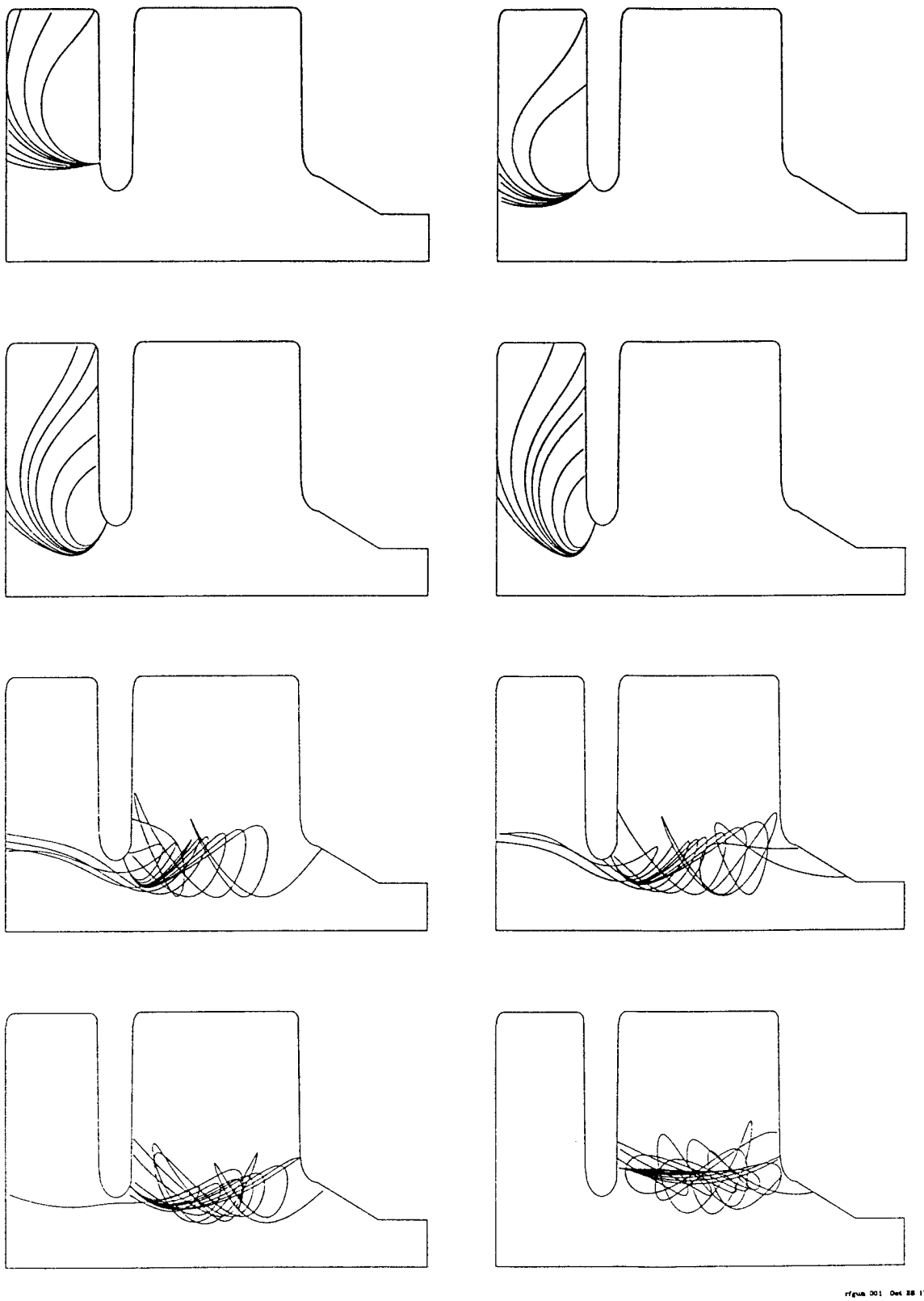


Figure 3 Dark current emission from the middle iris of the rf gun. Gradient at the cathode: 40MV/m, Solenoid on $Bz_{max} = 0.18$ T.

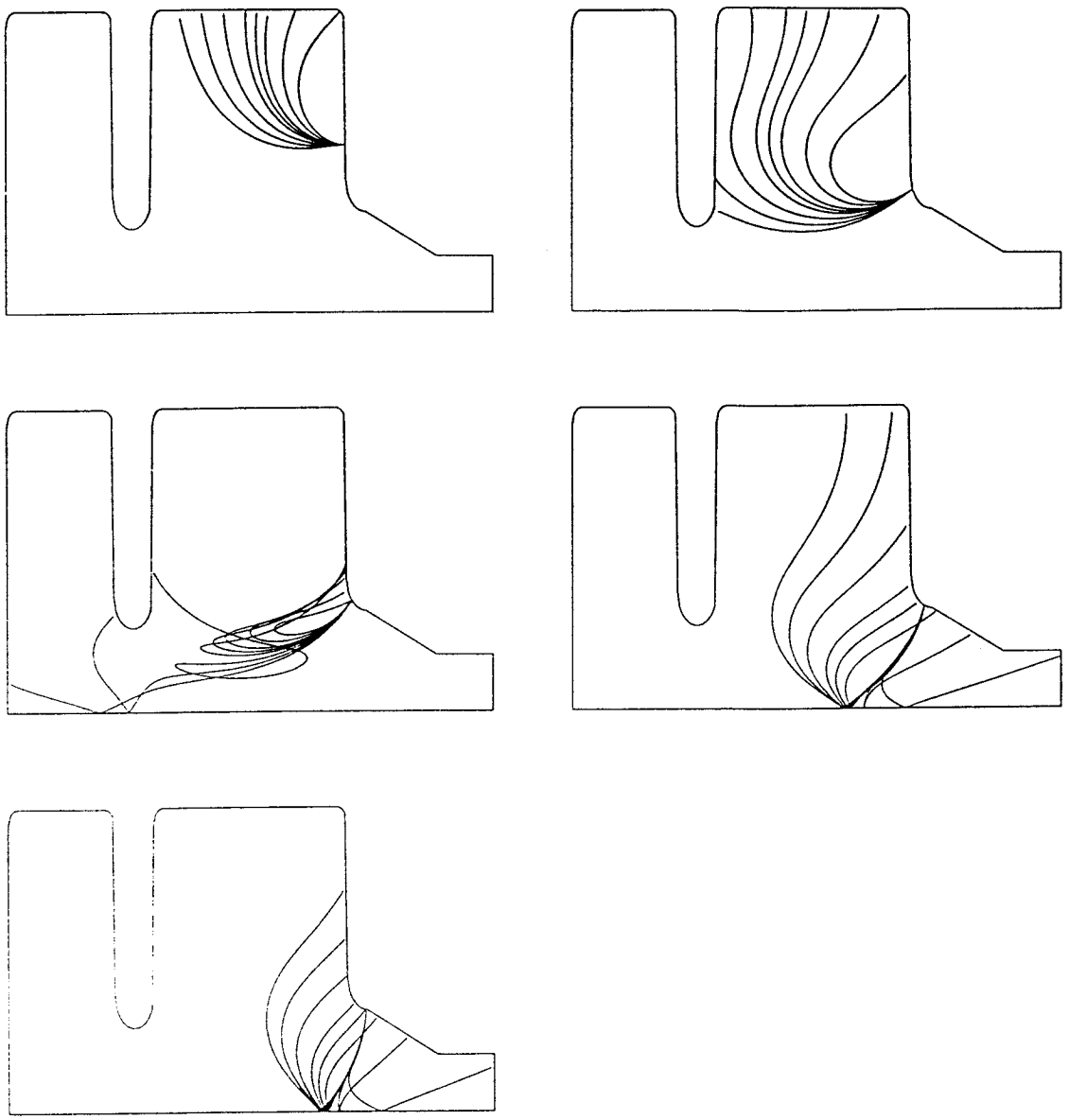


Figure 4 Dark current emission from the exit cell of the rf gun. Gradient at the cathode: 40 MV/m, Solenoid off.

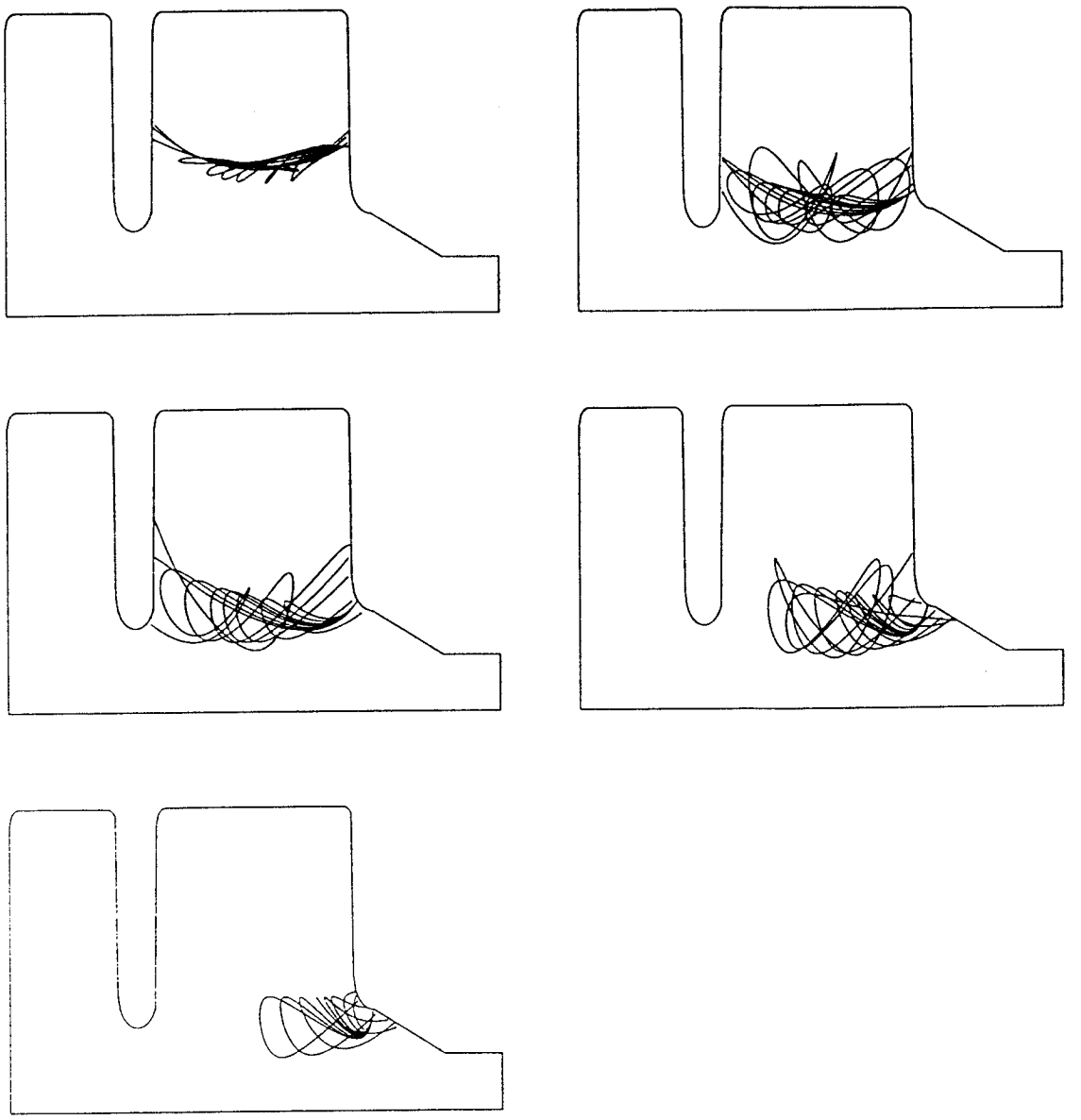
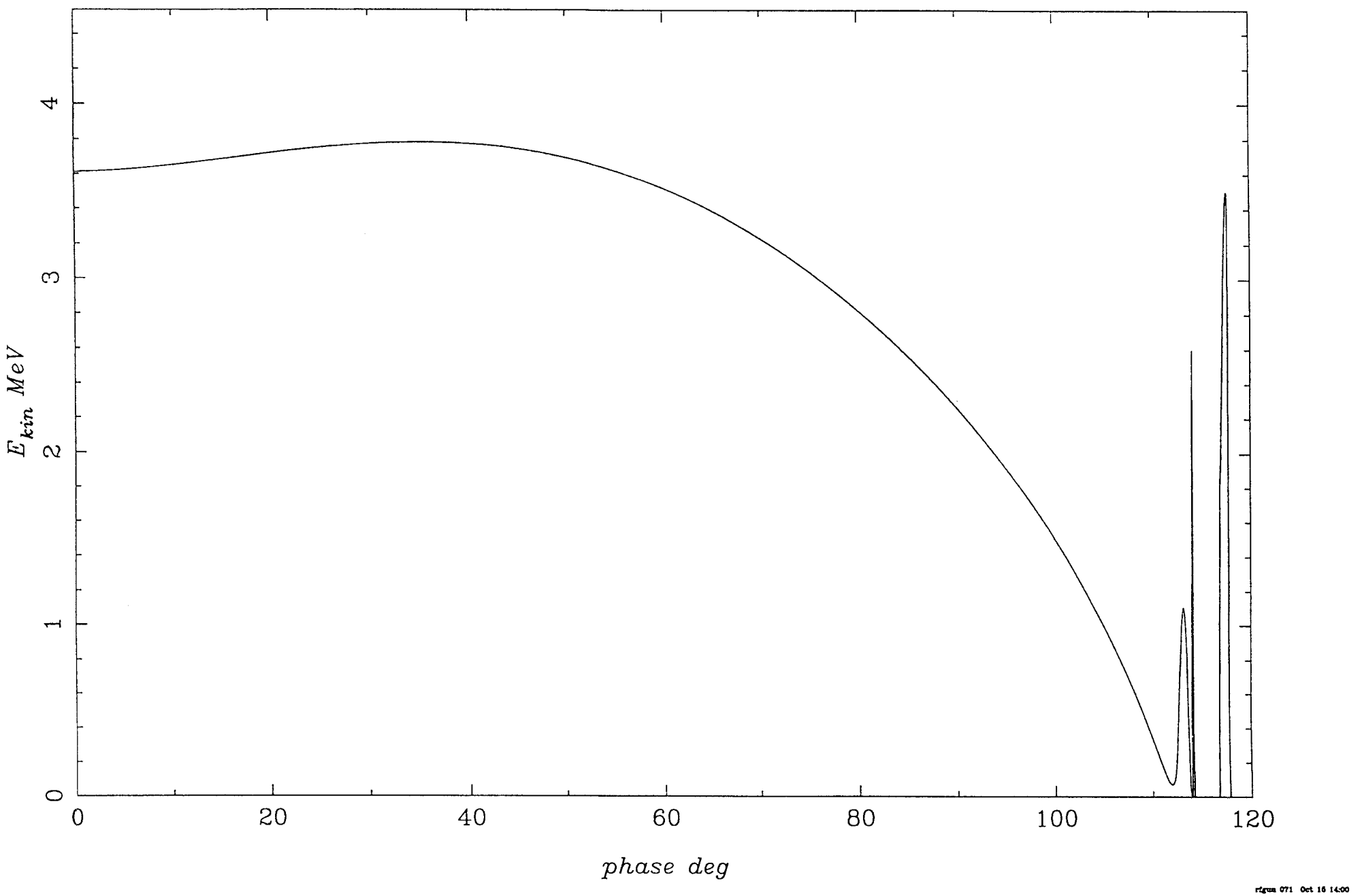
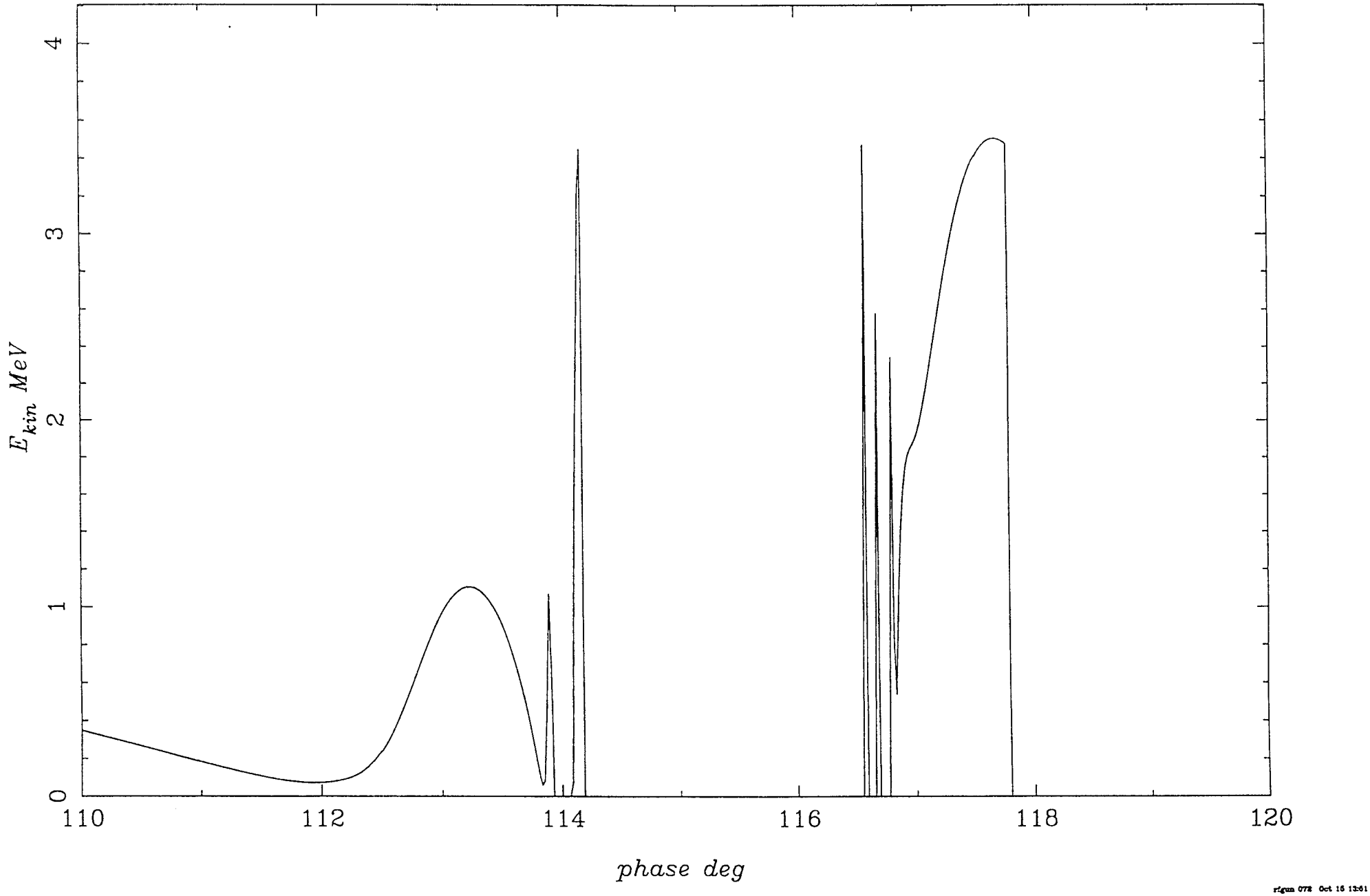
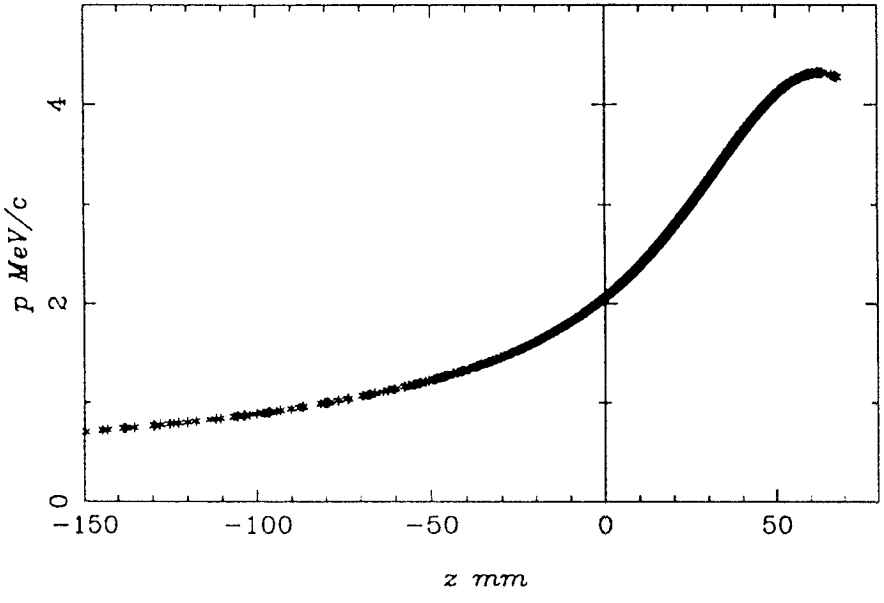


Figure 5 Dark current emission from the exit iris of the rf gun. Gradient at the cathode: 40 MV/m, Solenoid on Bz_{max}=0.18 T.

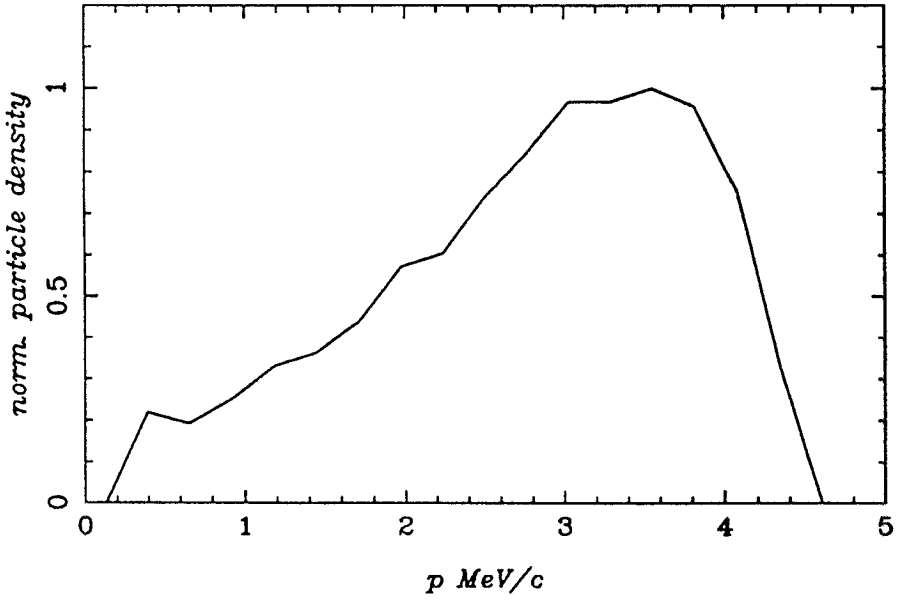

Energy vs. Phase
E_{kin} MeV
0
1
2
3
4
0
20
40
60
80
100
120
phase deg
rfgun 071 Oct 16 14:00


Energy vs. Phase
E_{kin} MeV
0
1
2
3
4
110
112
114
116
118
120
phase deg
rfgun 078 Oct 15 13:51

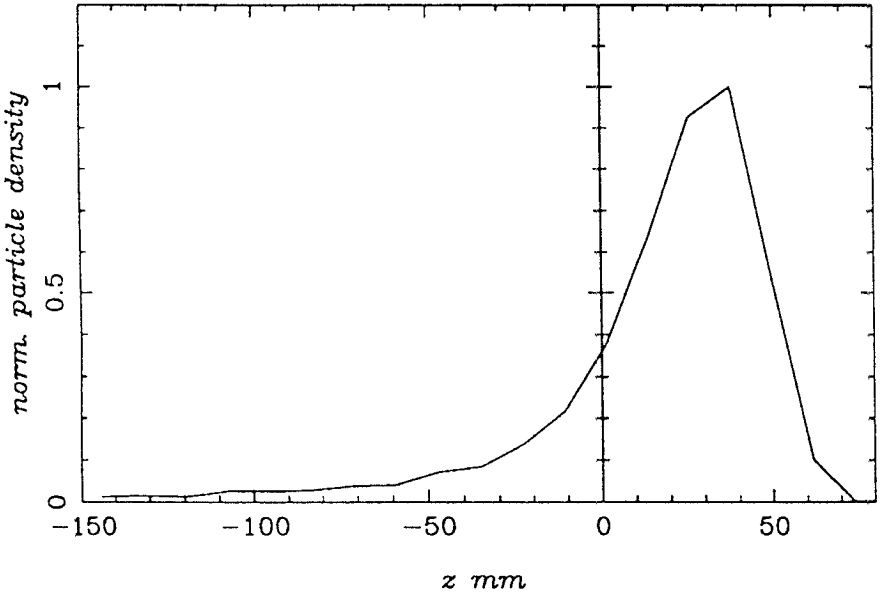
Longitudinal Phase–Space

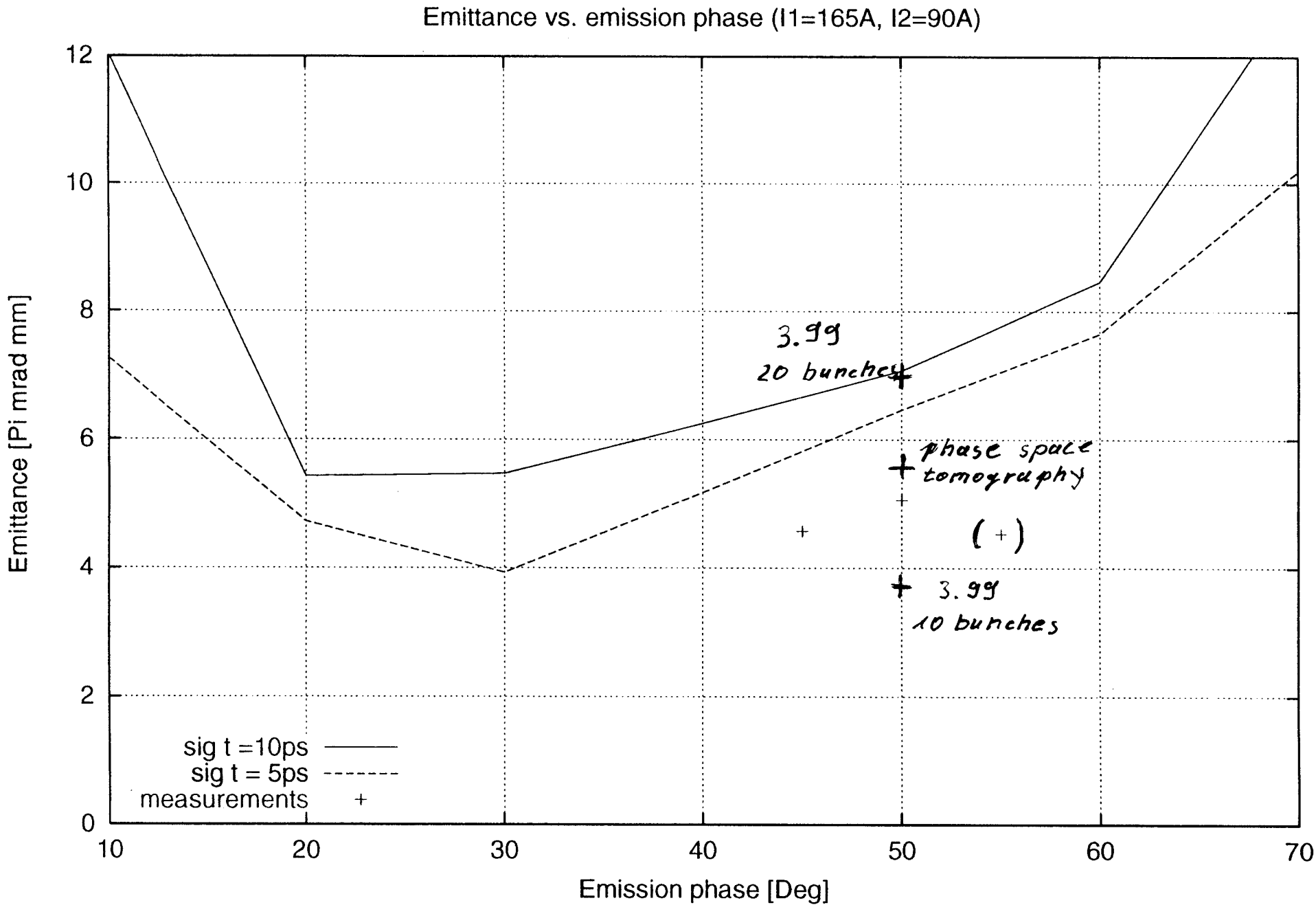


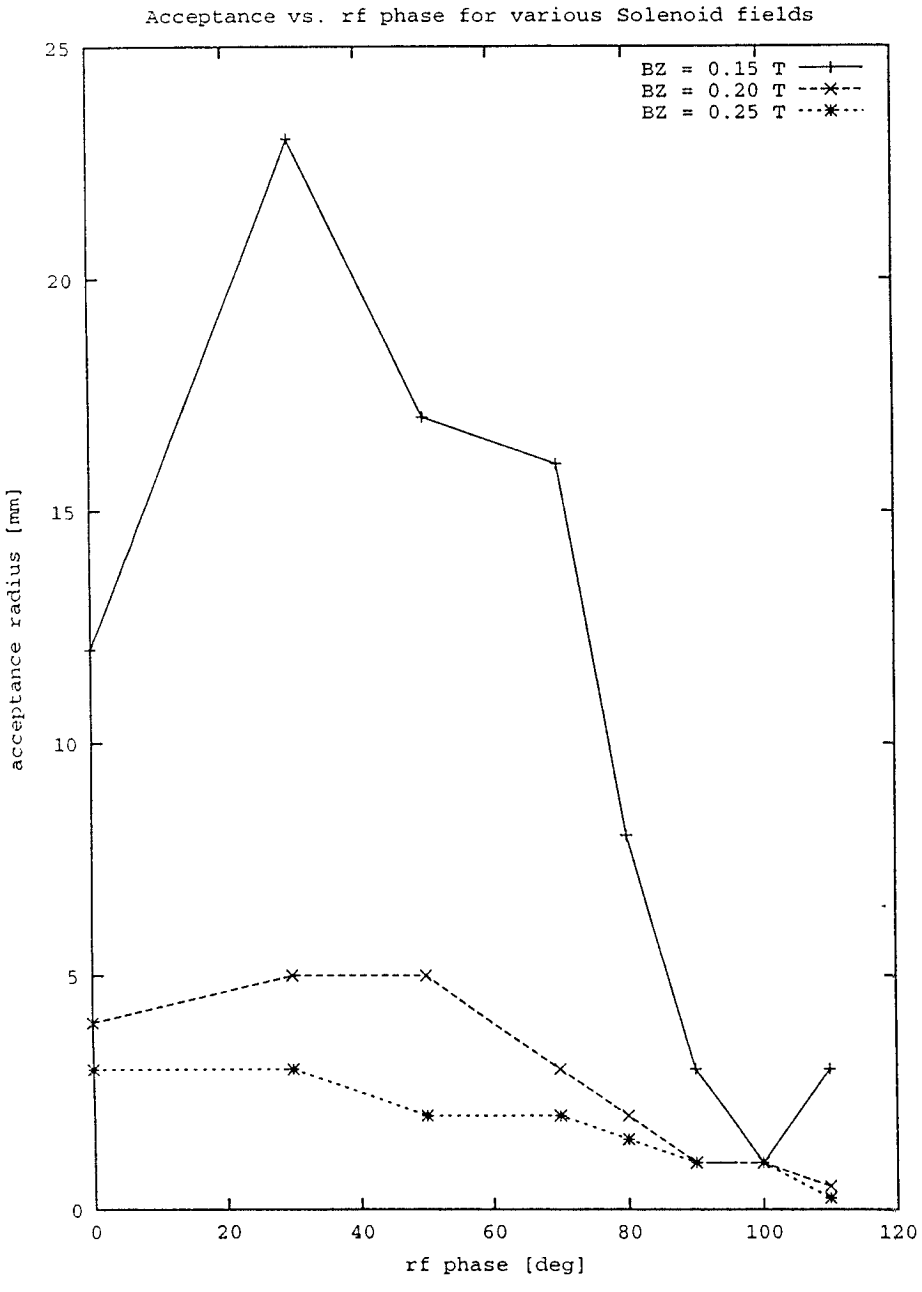
Momentum Spread

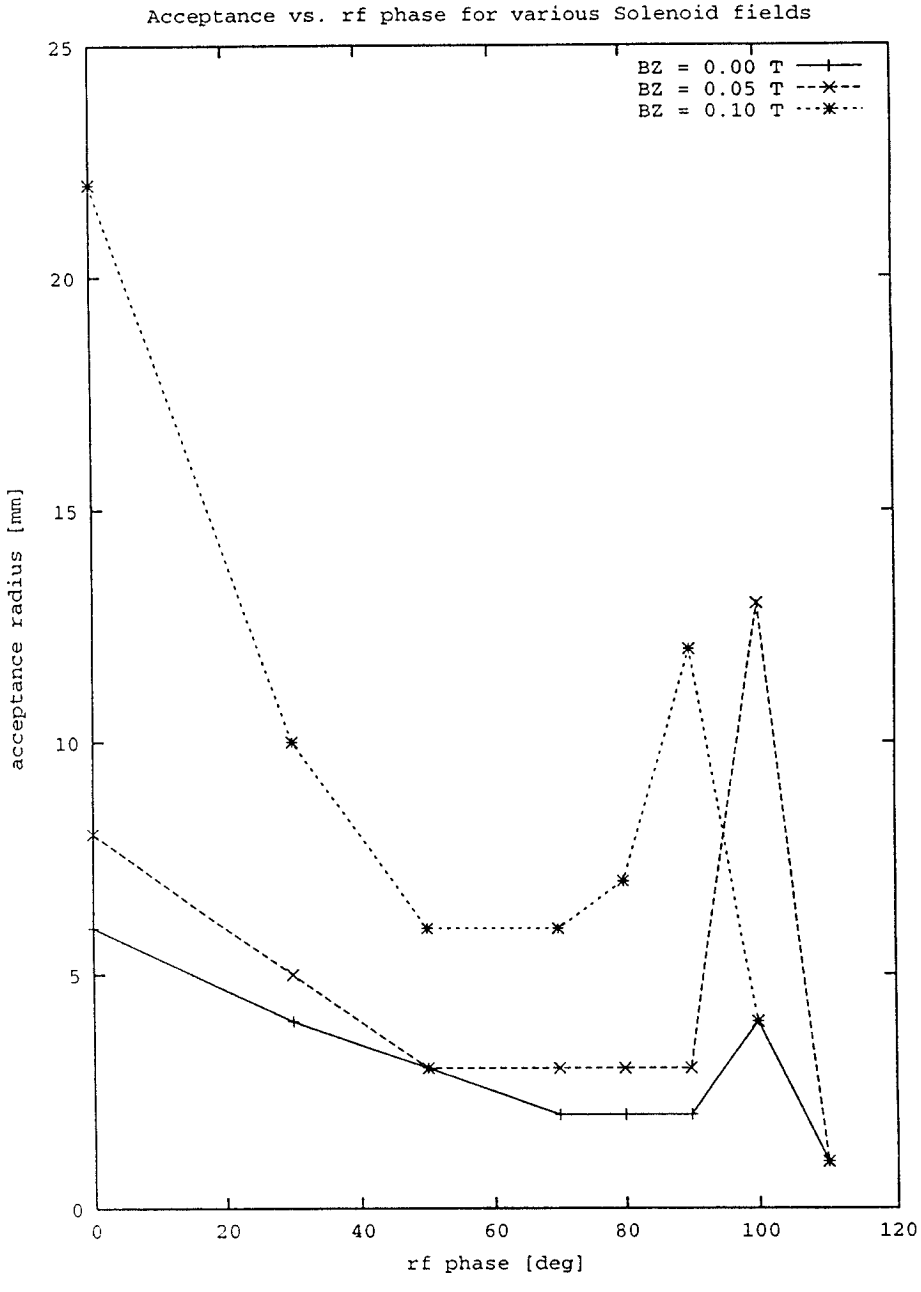


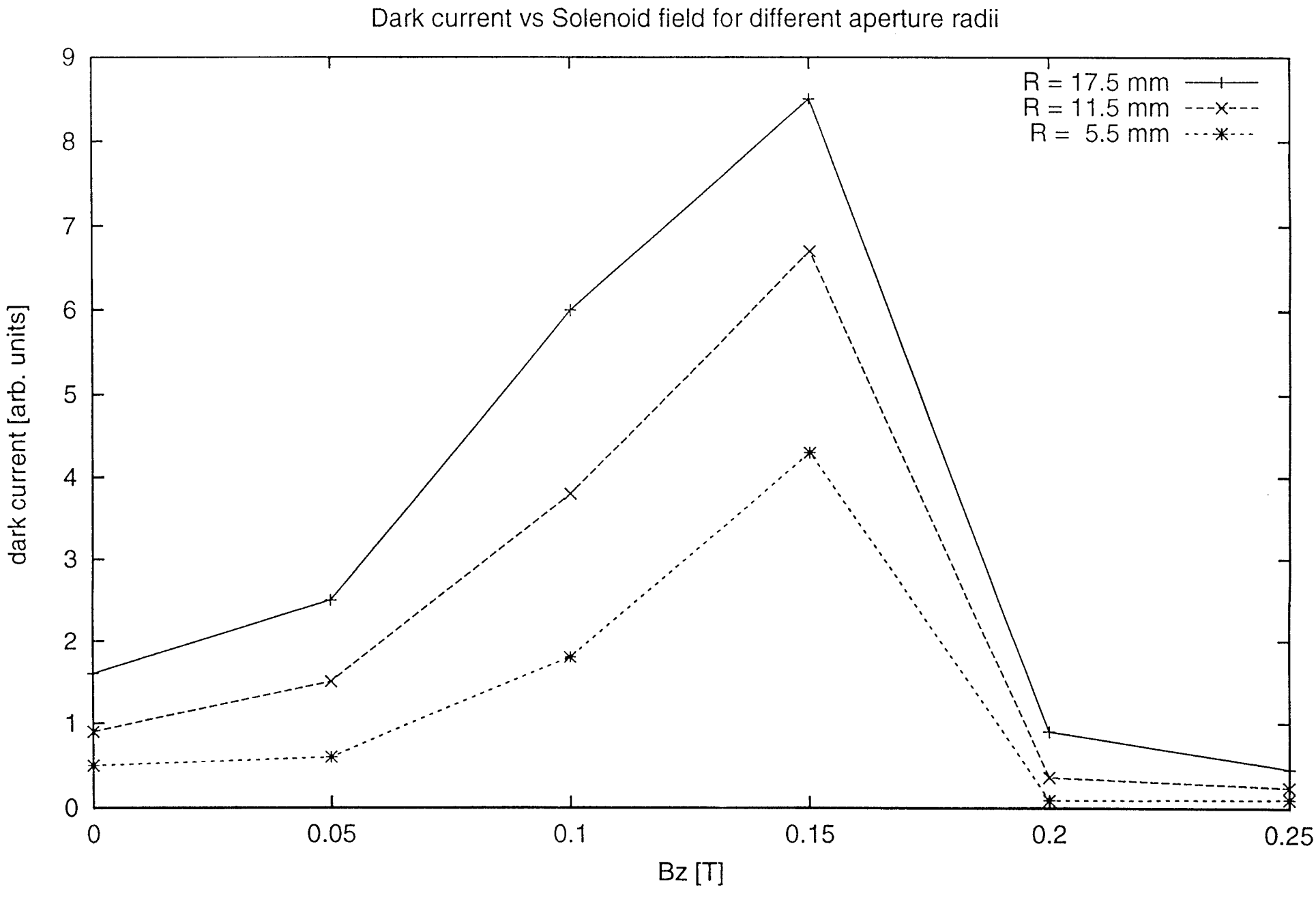
Longitudinal Distribution



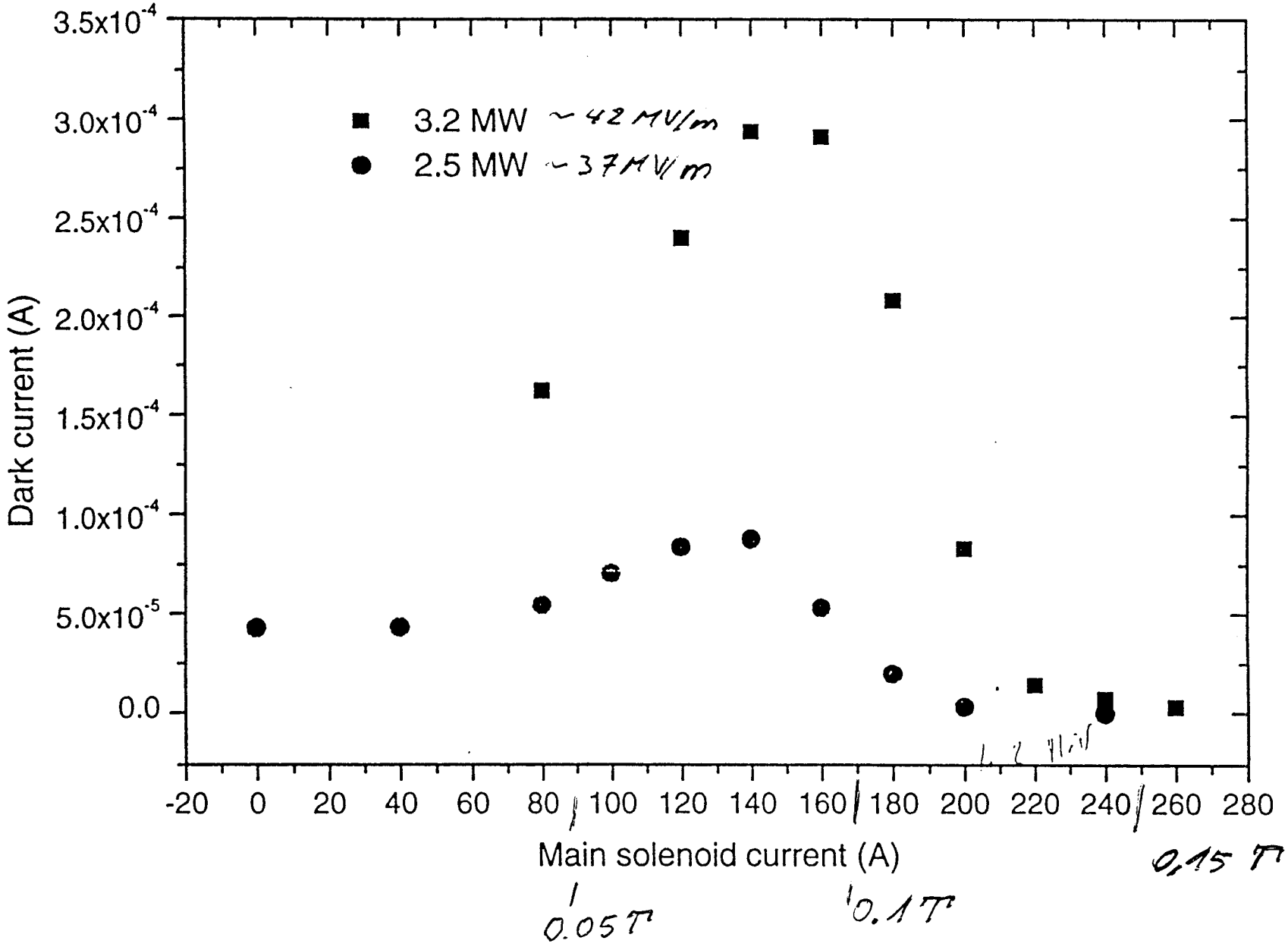

Emittance vs. emission phase (I1=165A, I2=90A)
Emittance [Pi mrad mm]
Emission phase [Deg]
12
10
8
6
4
2
0
10
20
30
40
50
60
70
sig t =10ps
sig t = 5ps
measurements
3.99
20 bunches
phase space
tomography
(+)
3.99
10 bunches


Acceptance vs. rf phase for various Solenoid fields
BZ = 0.15 T
BZ = 0.20 T
BZ = 0.25 T
acceptance radius [mm]
rf phase [deg]
0
5
10
15
20
25
0
20
40
60
80
100
120

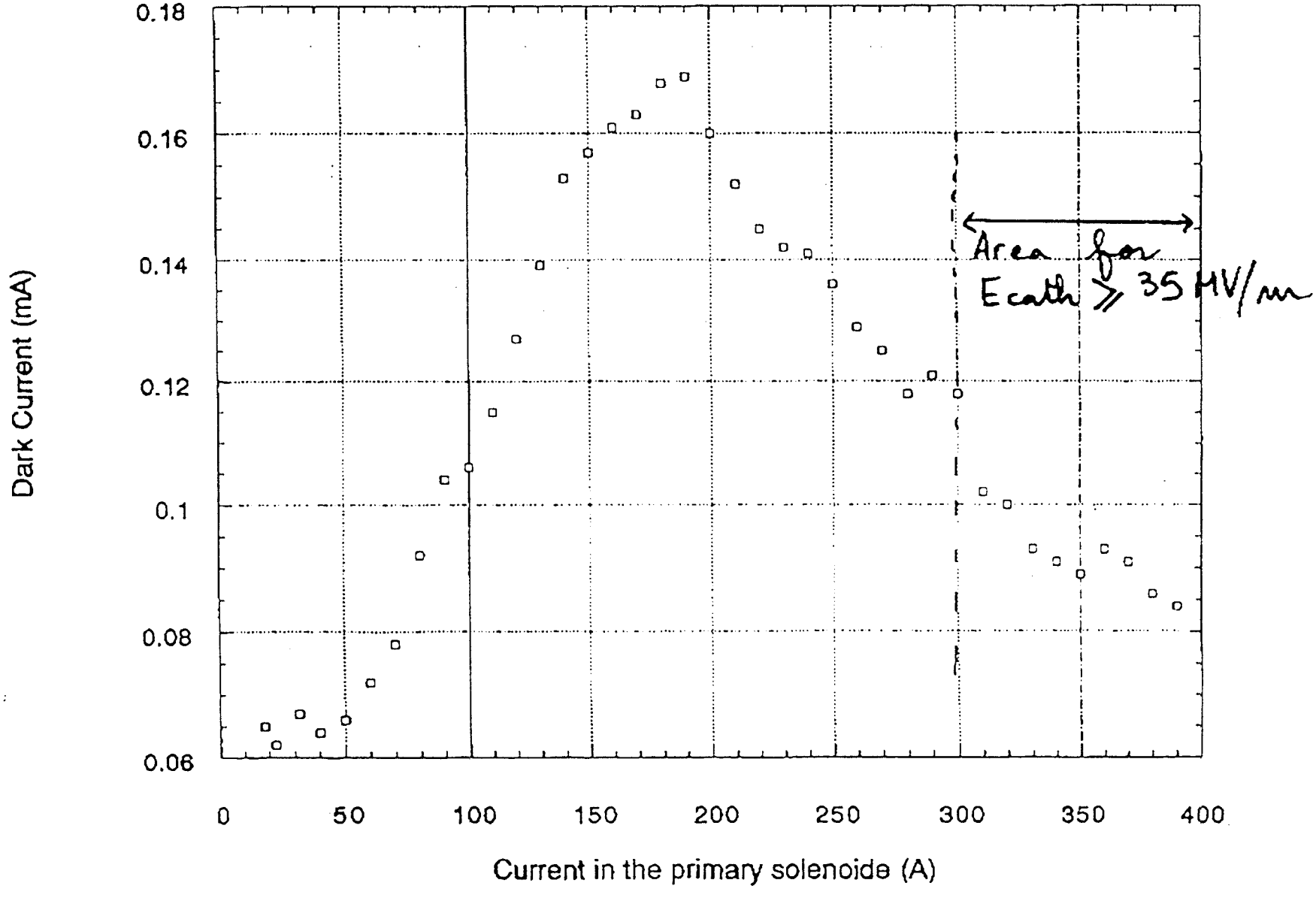

Acceptance vs. rf phase for various Solenoid fields
BZ = 0.00 T
BZ = 0.05 T
BZ = 0.10 T
acceptance radius [mm]
rf phase [deg]
0
5
10
15
20
25
0
20
40
60
80
100
120


Dark current vs Solenoid field for different aperture radii
R = 17.5 mm
R = 11.5 mm
R = 5.5 mm
dark current [arb. units]
Bz [T]
0
1
2
3
4
5
6
7
8
9
0
0.05
0.1
0.15
0.2
0.25

Dark current vs. solenoid field



Focussing of the dark current in the faraday cup with the secondary solenoid
Isec=0A, Itrim=0A, Pf=2.5 MW, Ecathode=37MV/m



29/09/98 16:03
SEP 29 '98 08:58AM

Focussing of the dark current in the faraday cup with the secondary solenoid
Itrim=0A, P1=2.5MW, Ecathode= 37MV/m