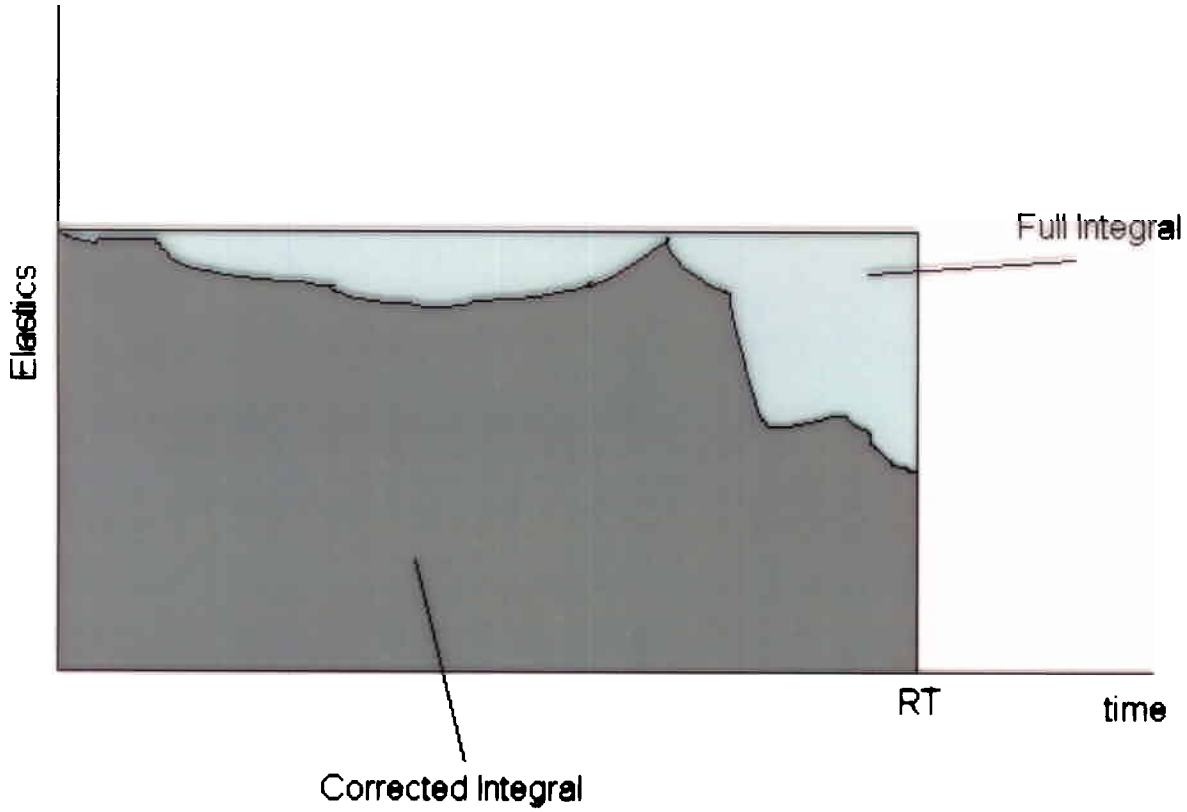
$^{16}O(\alpha,\gamma)^{20}Ne$ calculations



Example: Run8052

FC4 = 23 enA -> FC4 = $3.5893*10^{10}$ ions/s

Elastics in first 120 sec. = 948,

Total Elastics = 162002 = corrected integral, run time = 21930 s

948/120 = 7.9 ions/s -> 7.9 ions/s * 21930 s = 173247 = full integral

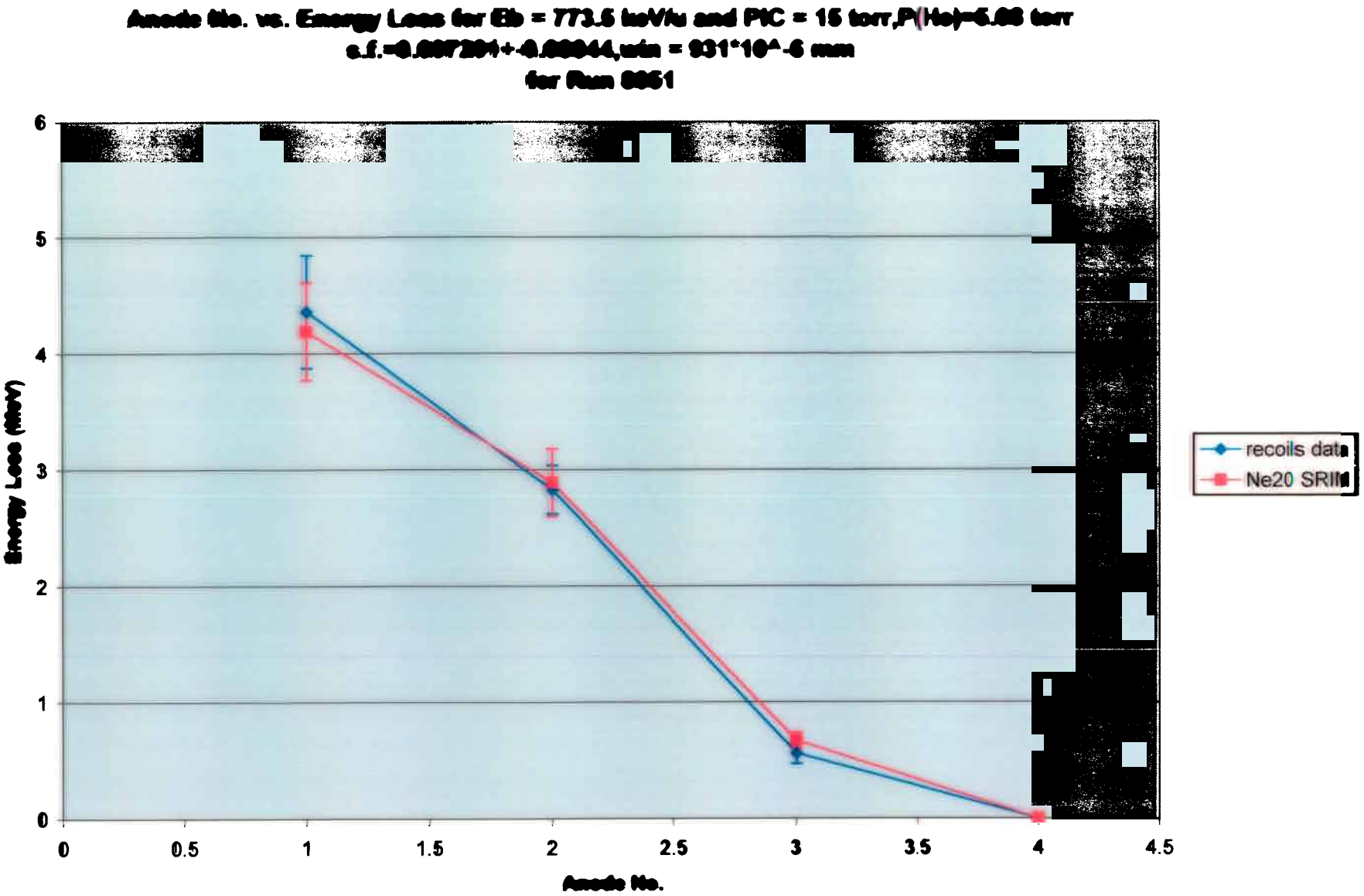
corrected/full = 162002/173247 = 0.935 = ε, our scale factor for FC4

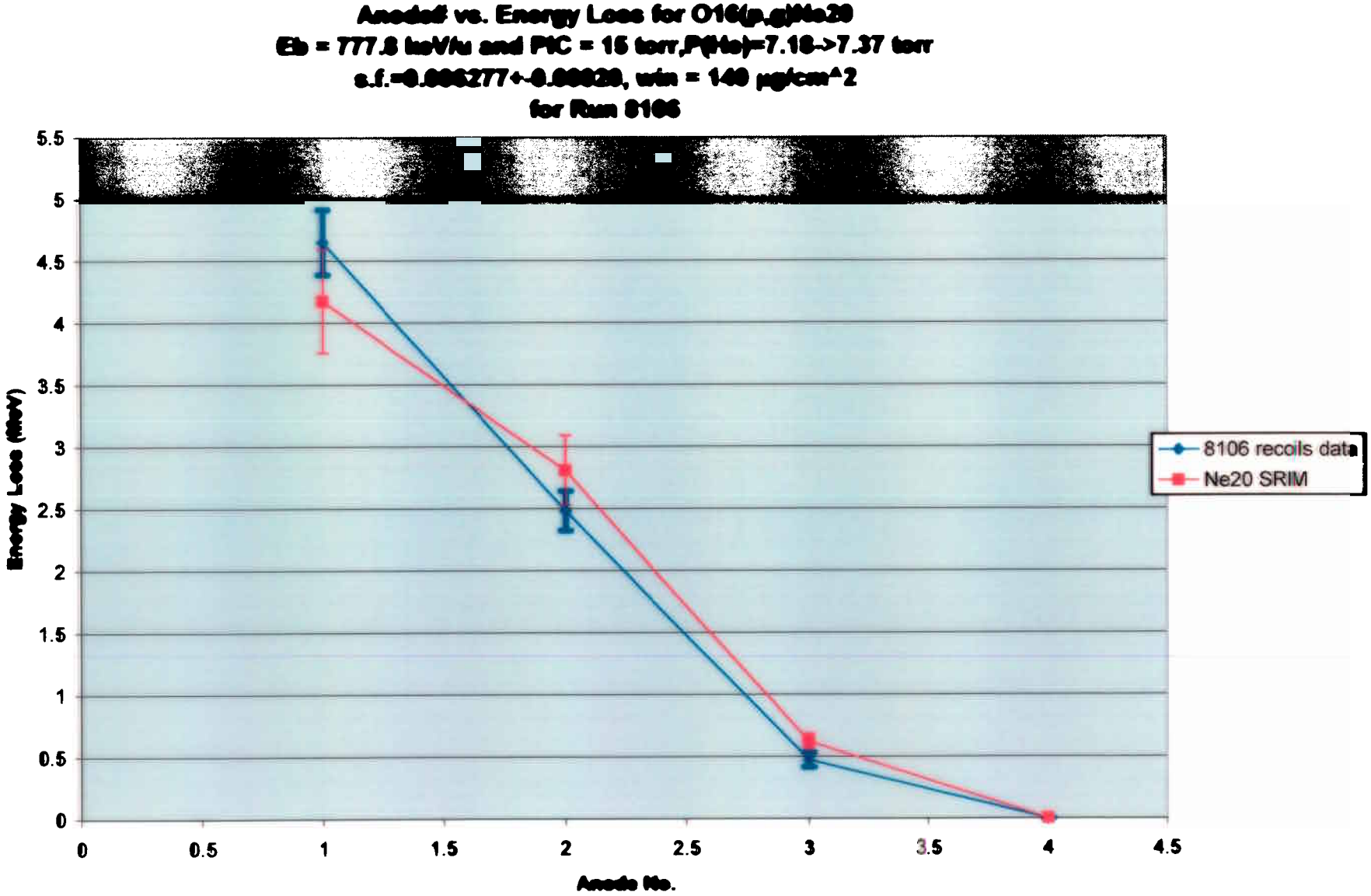
Total incident beam = FC4 * run time * ε = $7.36*10^{14}$ ions

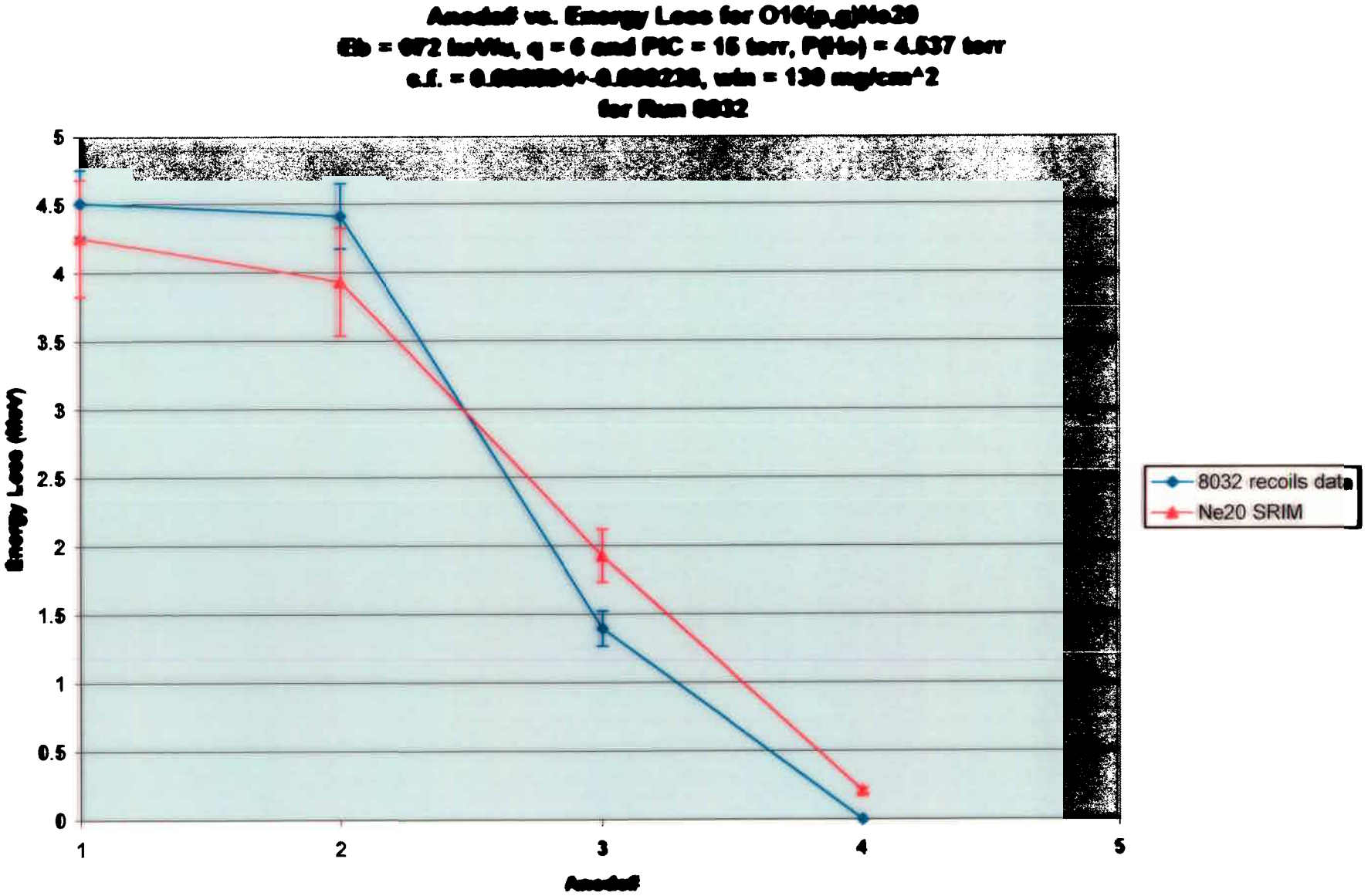
Expected partial yield = 45 counts (this assumes that $\omega\gamma$ = 4.4 meV for the roughly 765 keV/u resonance)

Coinc. Recoils = 18

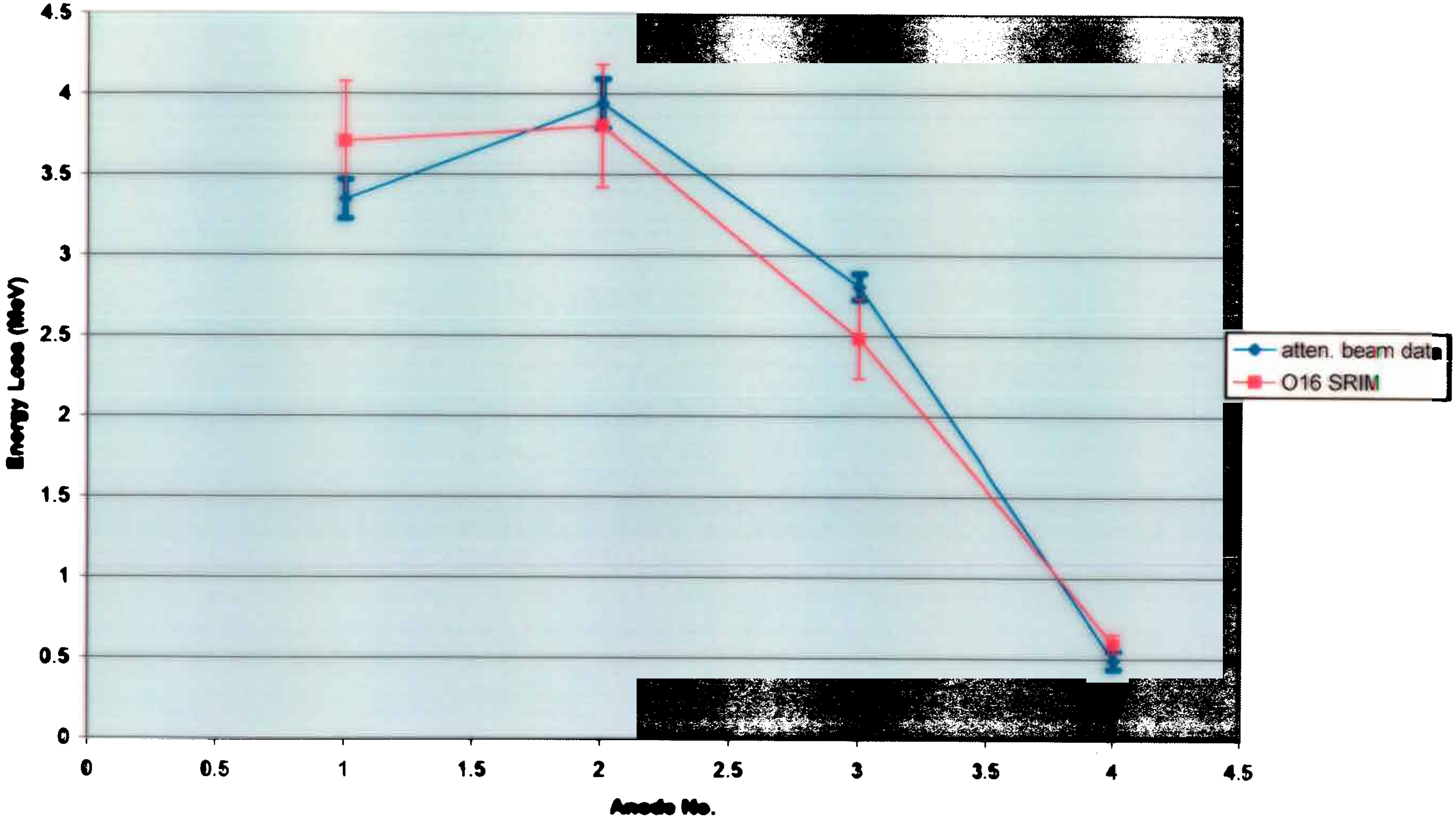
cRec/Exp. Counts = 0.4, which is roughly the efficiency of the BGO array

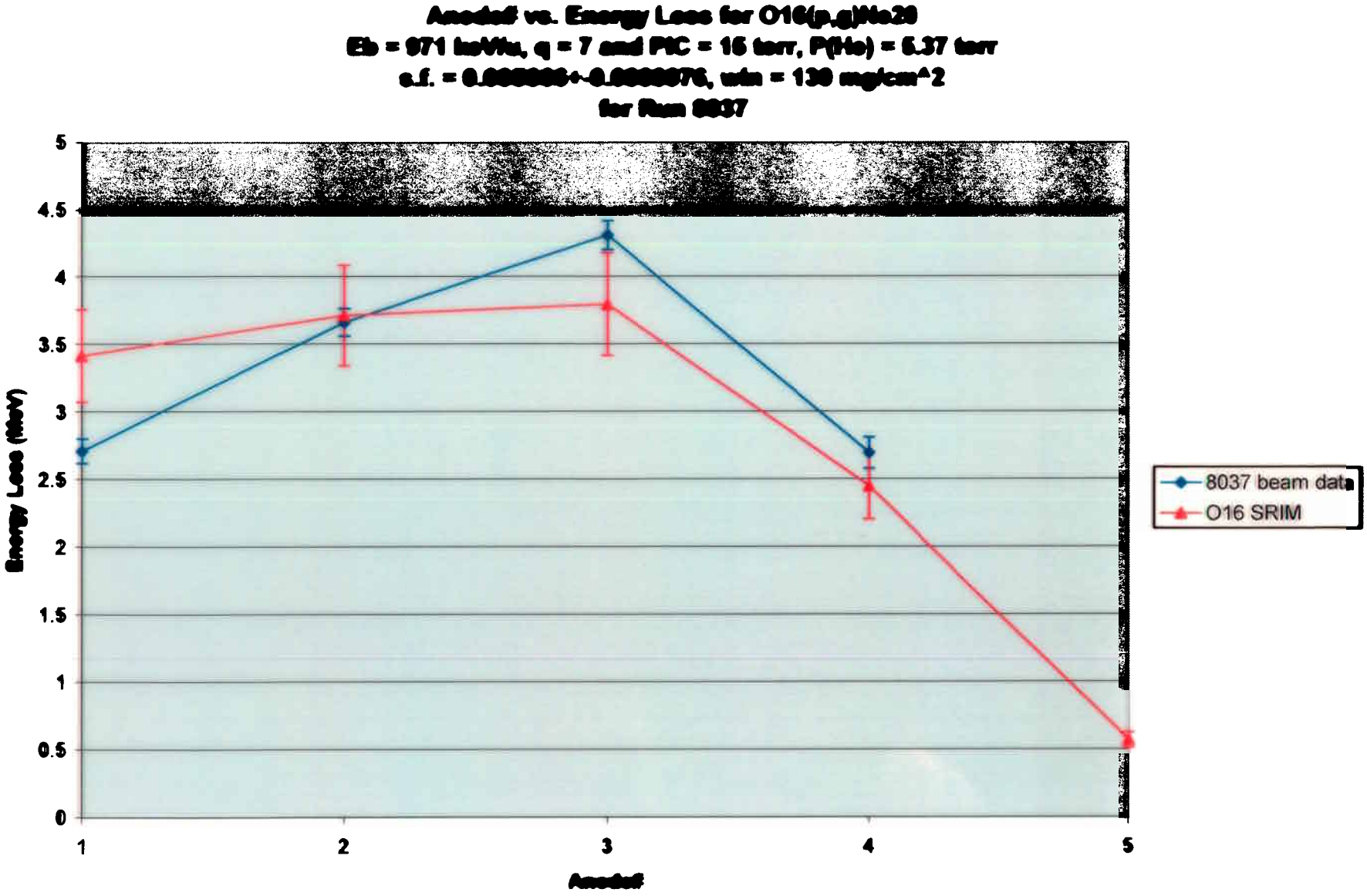

Anode No. vs. Energy Loss for Eb = 773.5 keV/u and PIC = 15 torr,P(He)=5.68 torr
s.f.=0.997291+-0.00044,min = 931*10^-6 mm
for Run 0051
Energy Loss (MeV)
Anode No.
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
0
1
2
3
4
5
6
recoils data
Ne20 SRIM

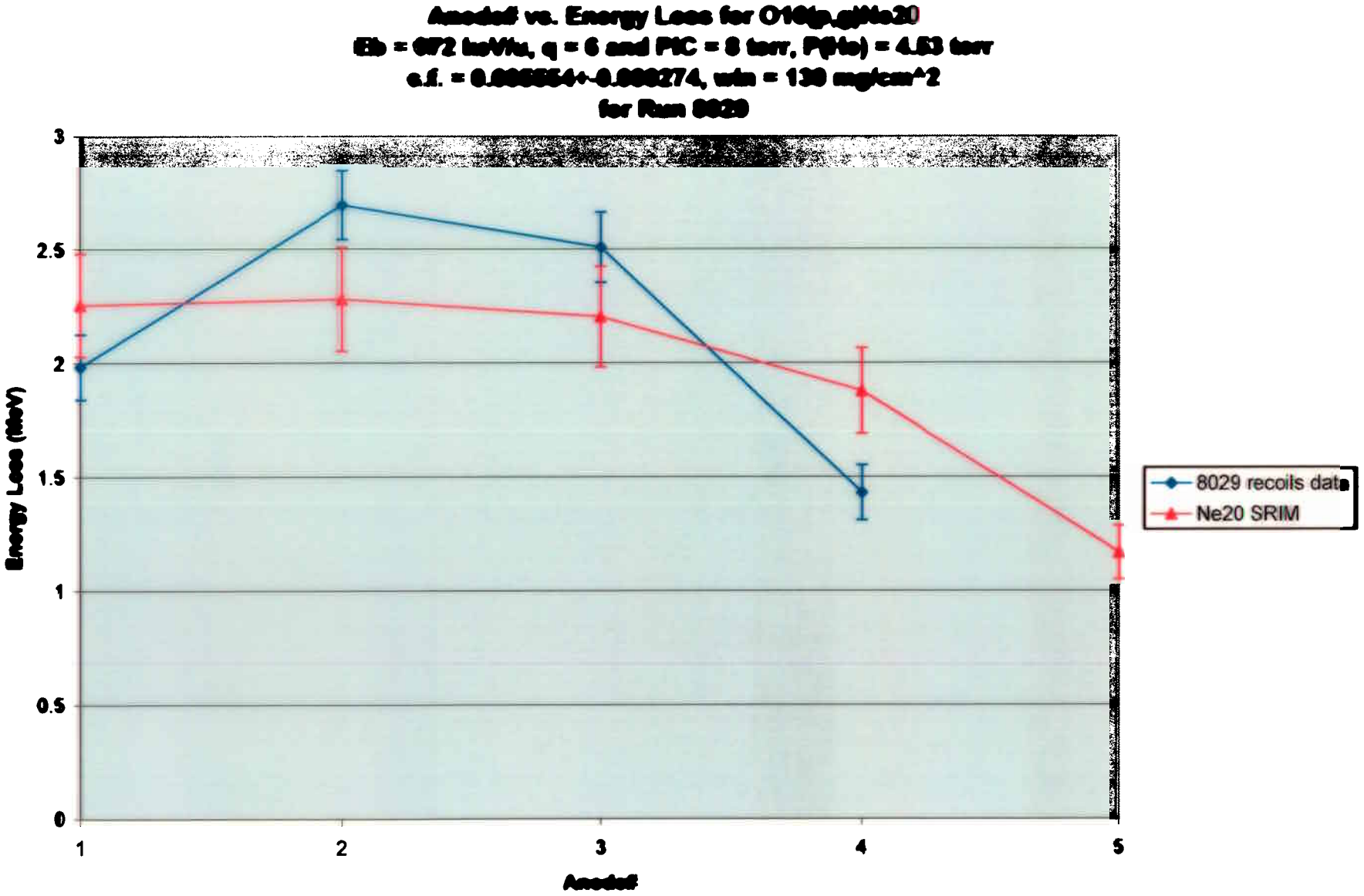

Anode# vs. Energy Loss for O16(p,g)Ne20
Eb = 777.8 keV/u and PIC = 15 torr,P(He)=7.18->7.37 torr
s.f.=0.666277+-0.00020, win = 140 µg/cm^2
for Run 8106
Energy Loss (MeV)
Anode No.
8106 recoils data
Ne20 SRIM
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5


Anodeif vs. Energy Loss for O16(p,g)Ne20
Eb = 972 keV/u, q = 6 and PIC = 15 torr, P(He) = 4.537 torr
for Run 8032
Energy Loss (MeV)
Anodeif
8032 recoils data
Ne20 SRIM

Anode# vs. Energy Loss for O16(p,g)Ne20
Eb = 777.8 keV/u and PIC = 15 torr,P(He)=7.2 torr
e.f.=0.005582+-0.00013, win = 140 µg/cm^2
for Run 8165




Anode# vs. Energy Loss for O16(p,g)Ne20
Eb = 971 keV/u, q = 7 and PIC = 15 torr, P(He) = 5.37 torr
e.f. = 0.[illegible]+-0.[illegible], win = 130 mg/cm^2
for Run 8037
Energy Loss (MeV)
Anode#
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
1
2
3
4
5
8037 beam data
O16 SRIM


Anode# vs. Energy Loss for O16lg_gHe20
Eb = 672 keV/u, q = 6 and PIC = 8 torr, P(He) = 4.53 torr
e.f. = 0.666564+-0.666274, win = 130 mg/cm^2
for Run 8029
Energy Loss (MeV)
Anode#
0
0.5
1
1.5
2
2.5
3
1
2
3
4
5
8029 recoils data
Ne20 SRIM