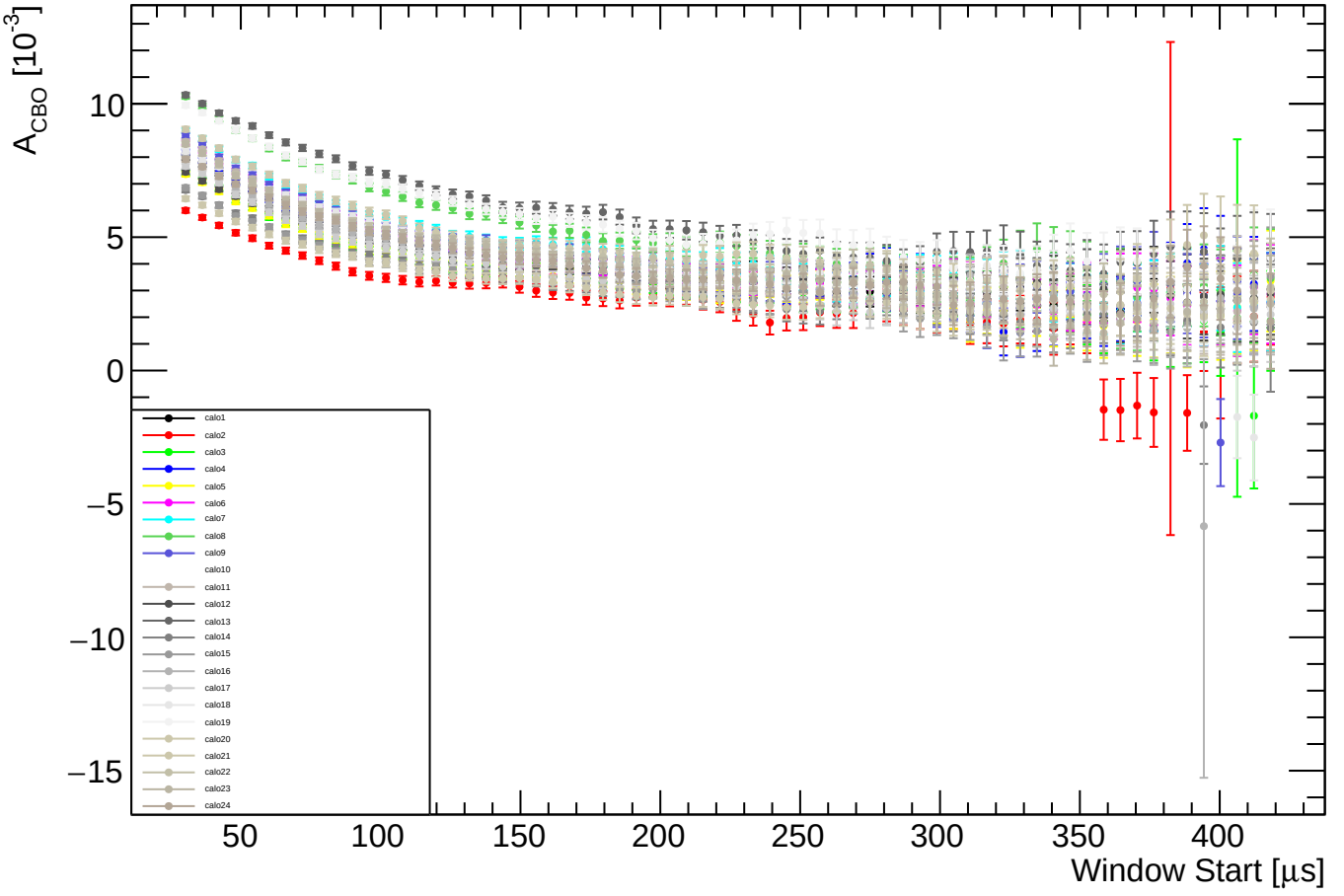
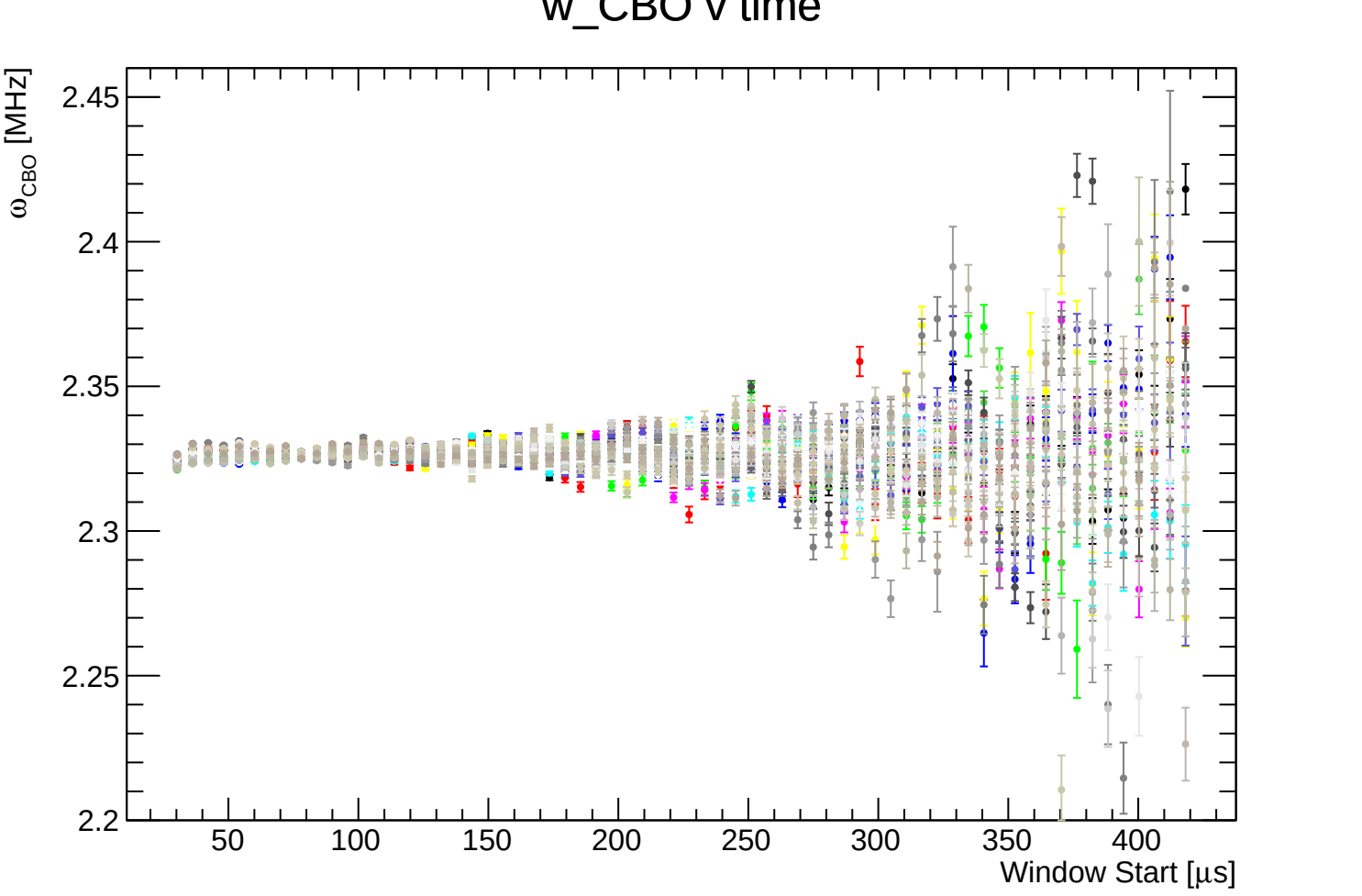
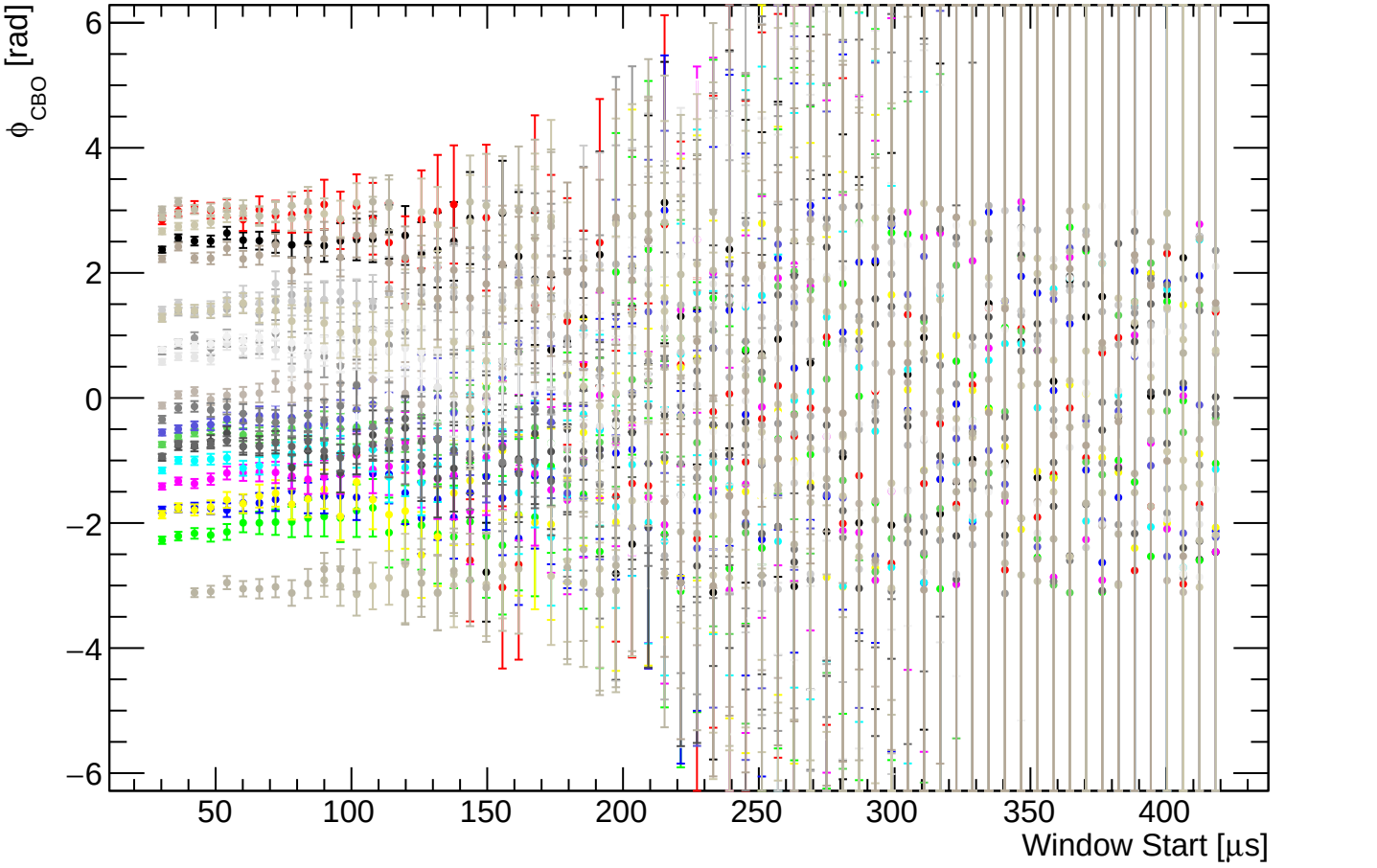
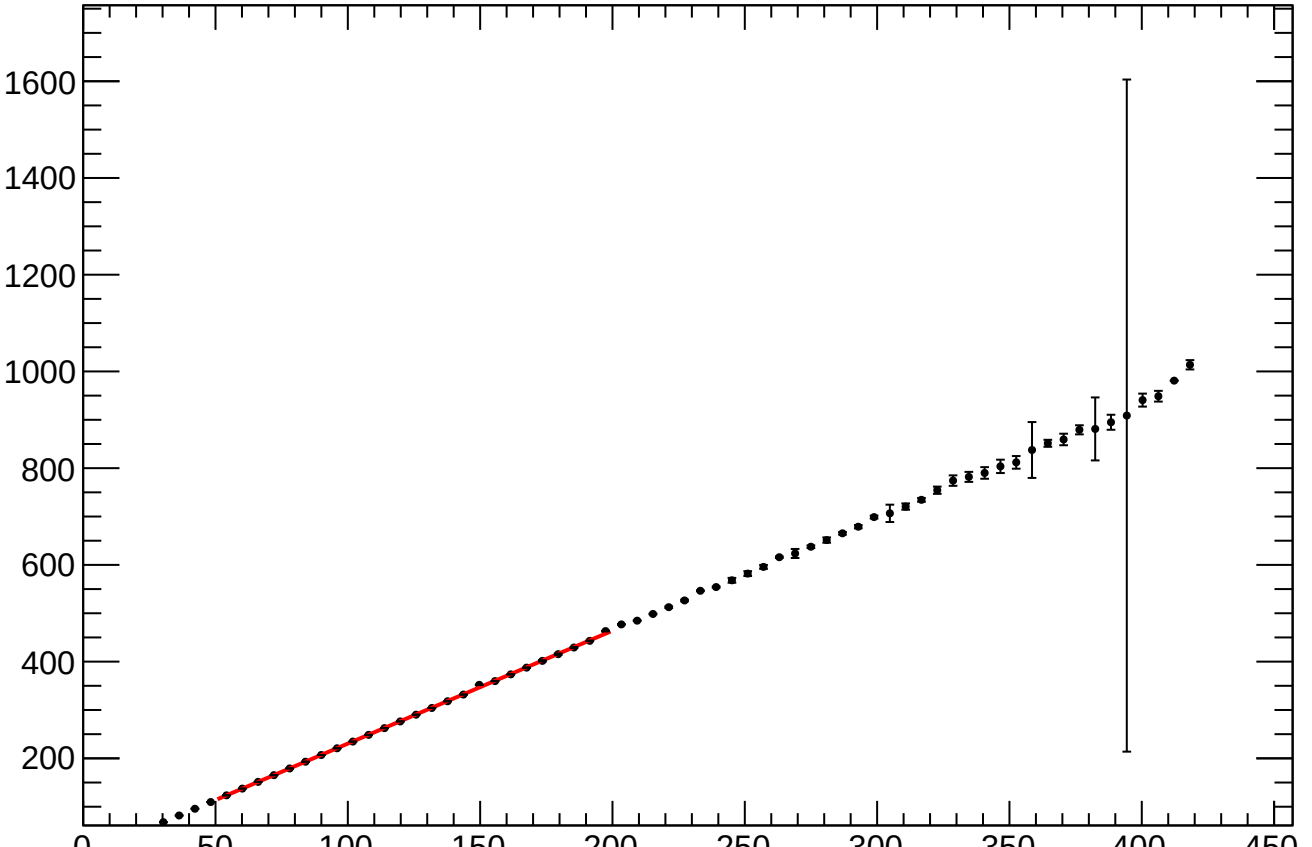
A_CBO v time


A_{CBO} [10^{-3}]
10
5
0
−5
−10
−15
50
100
150
200
250
300
350
400
Window Start [μs]
calo1
calo2
calo3
calo4
calo5
calo6
calo7
calo8
calo9
calo10
calo11
calo12
calo13
calo14
calo15
calo16
calo17
calo18
calo19
calo20
calo21
calo22
calo23
calo24


w_CBO v time
ω_{CBO} [MHz]
2.45
2.4
2.35
2.3
2.25
2.2
50
100
150
200
250
300
350
400
Window Start [μs]


p_CBO v time
ϕ_{CBO} [rad]
6
4
2
0
−2
−4
−6
50
100
150
200
250
300
350
400
Window Start [μs]


1600
1400
1200
1000
800
600
400
200
0
50
100
150
200
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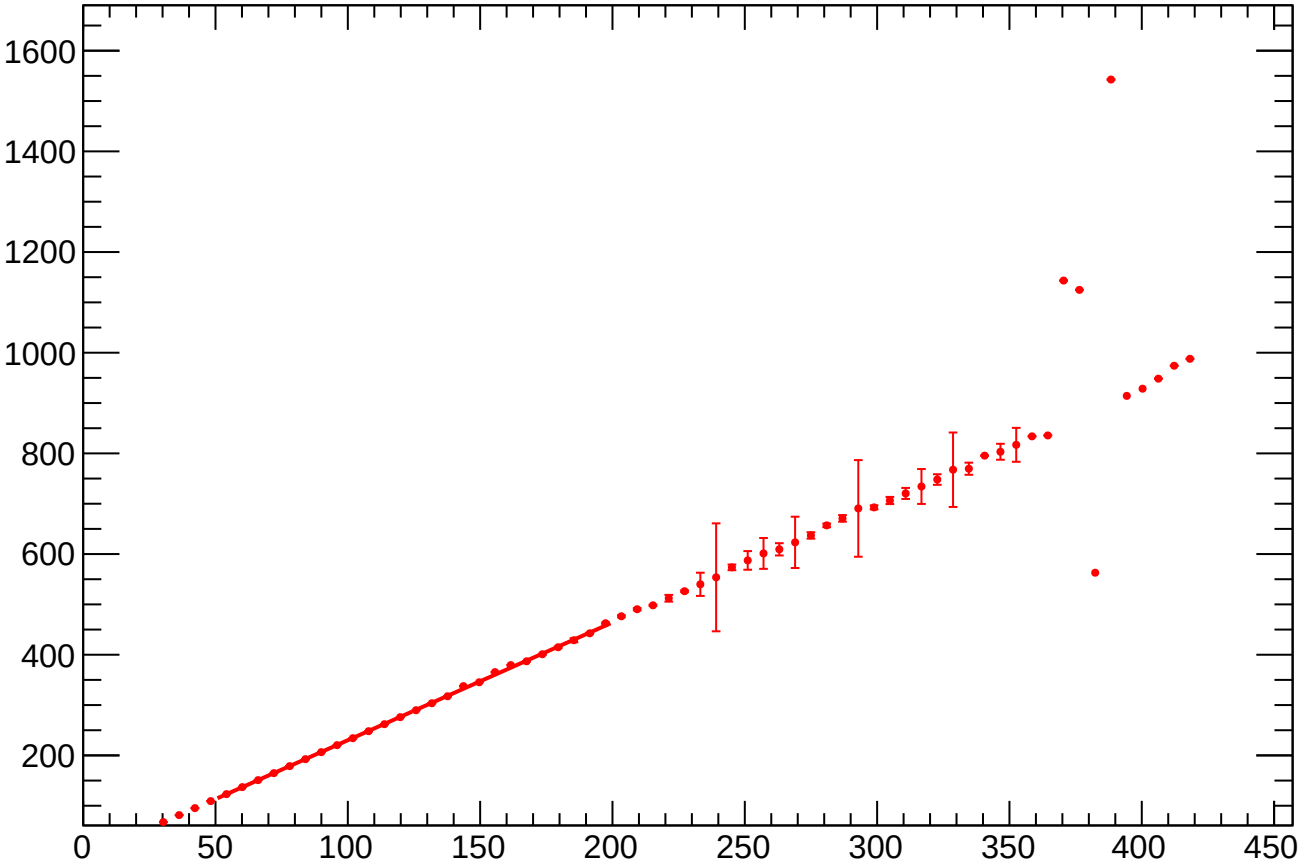
300
350
400
450


1600
1400
1200
1000
800
600
400
200
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100
150
200
250
300
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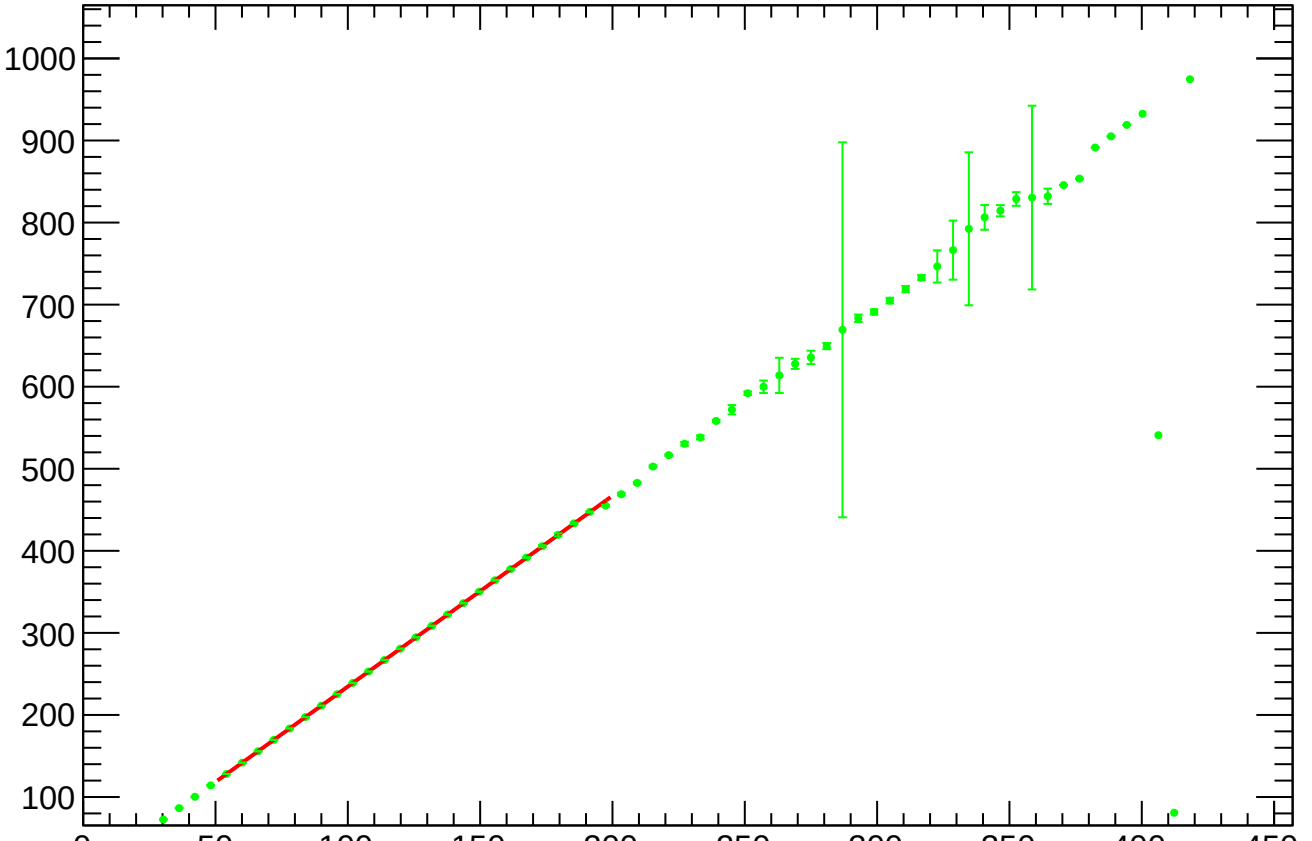
400
450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100
150
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300
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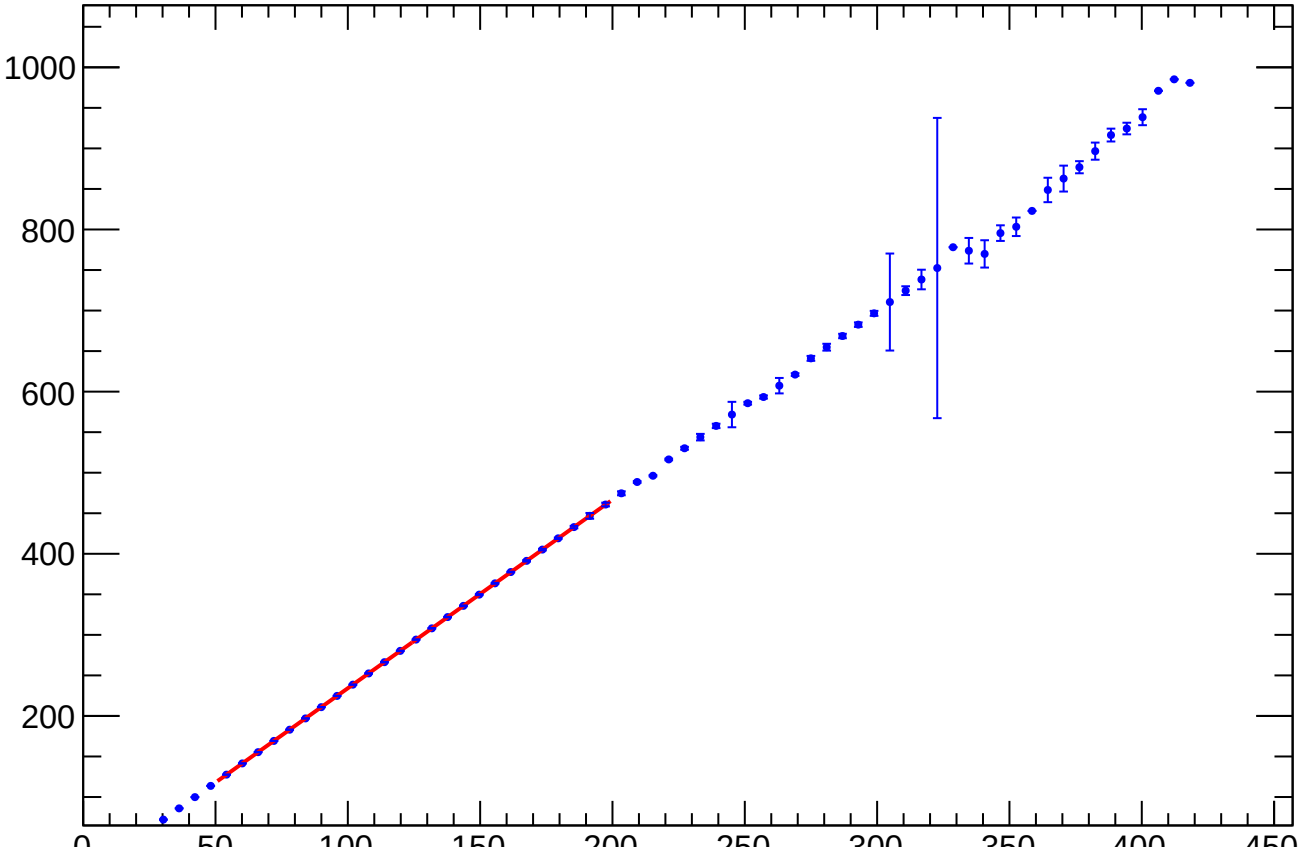
400
450


1000
800
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400
200
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100
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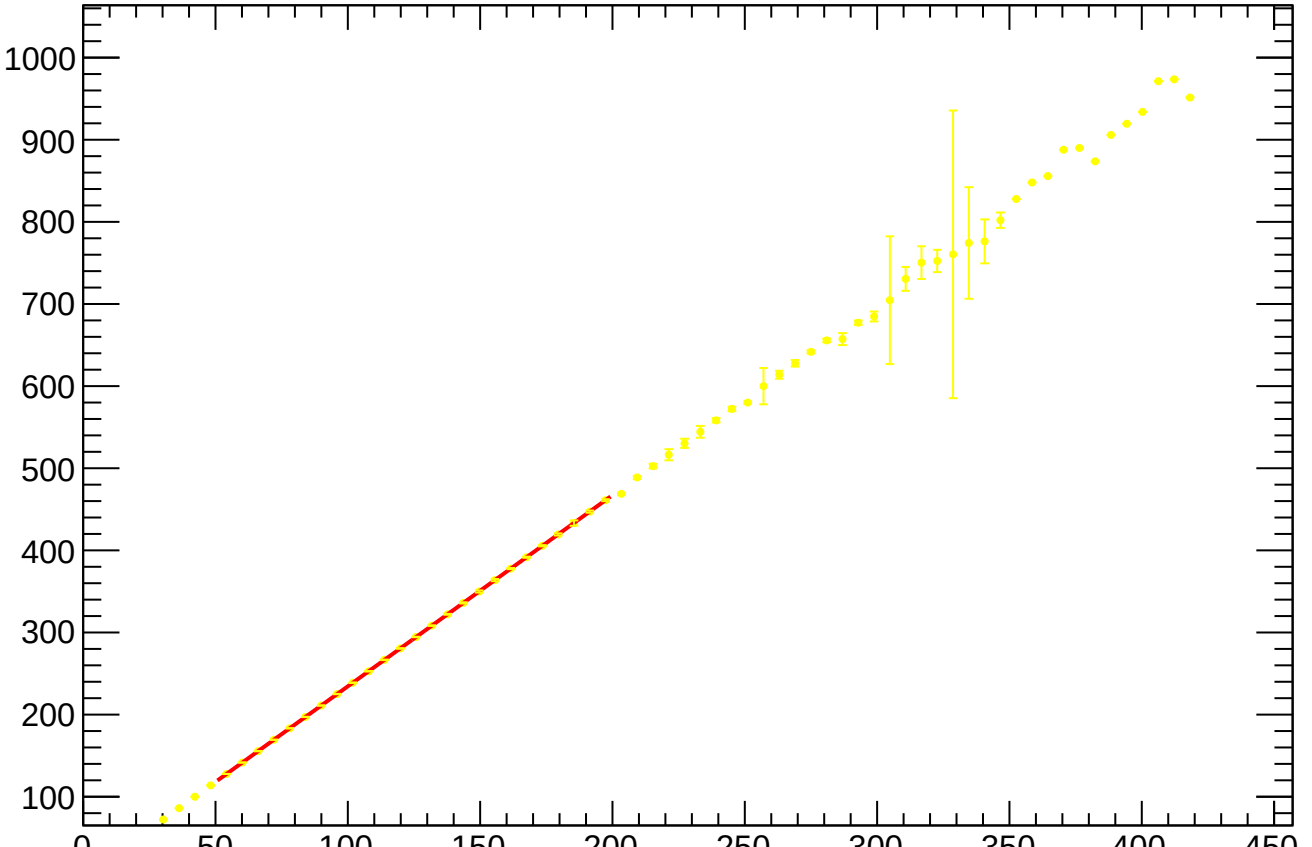
200
250
300
350
400
450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100
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400
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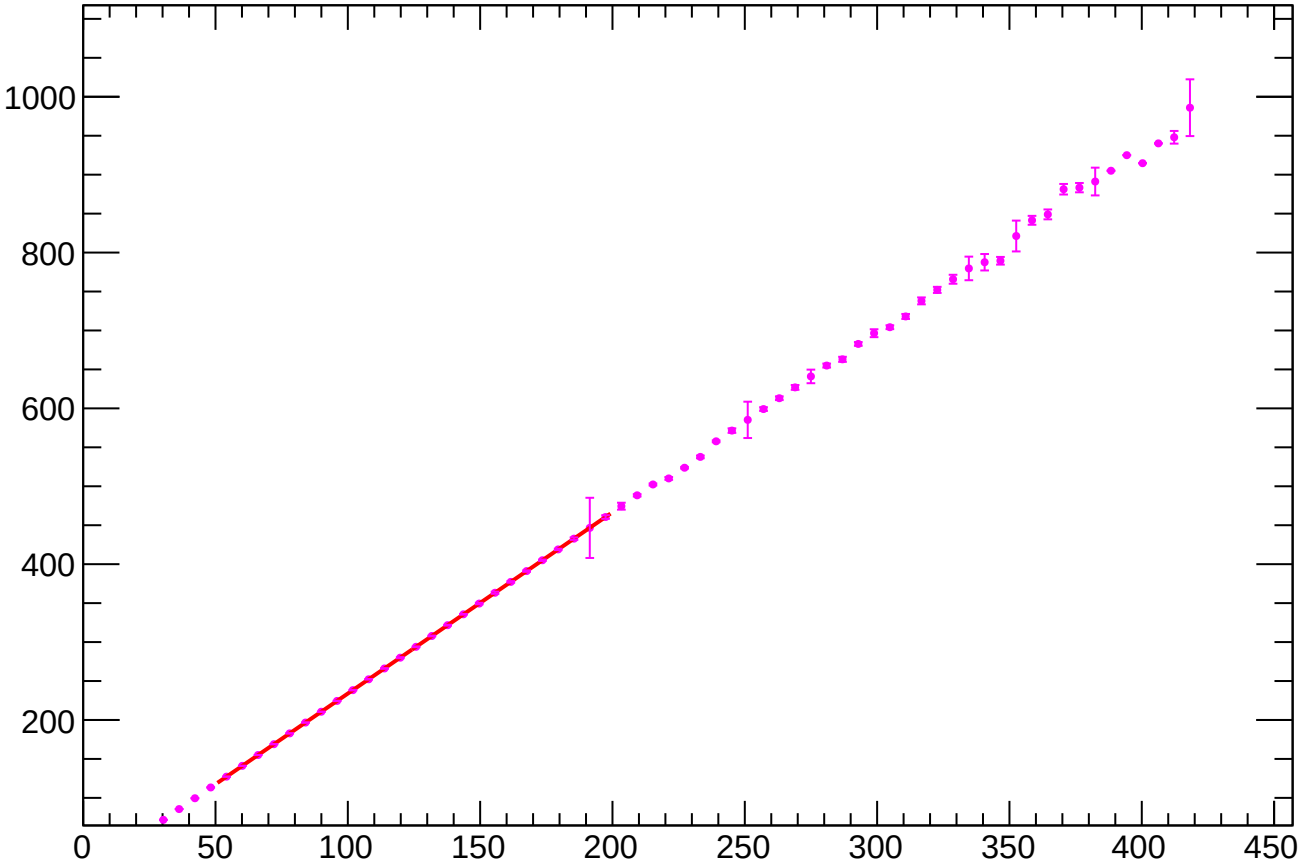
1000
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400
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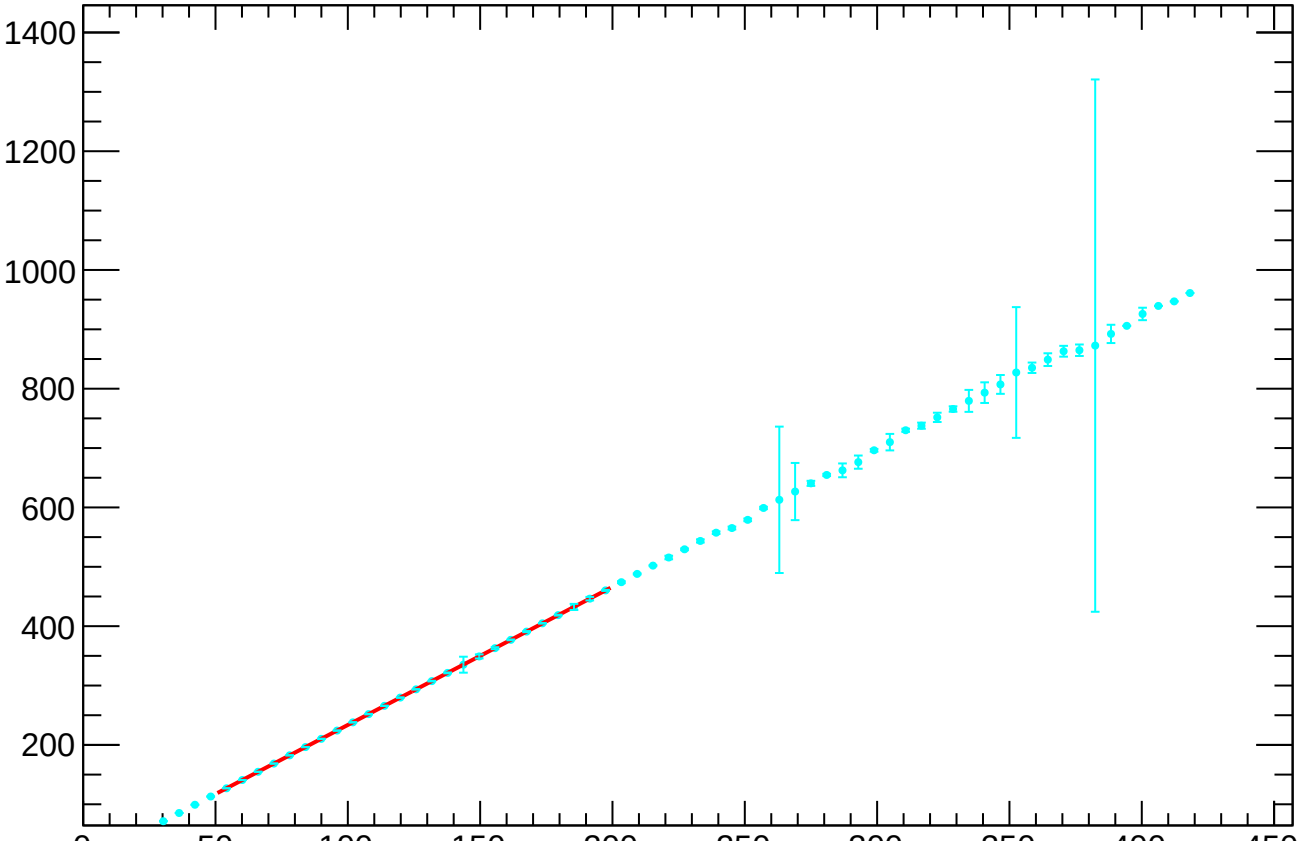
1400
1200
1000
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100
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400
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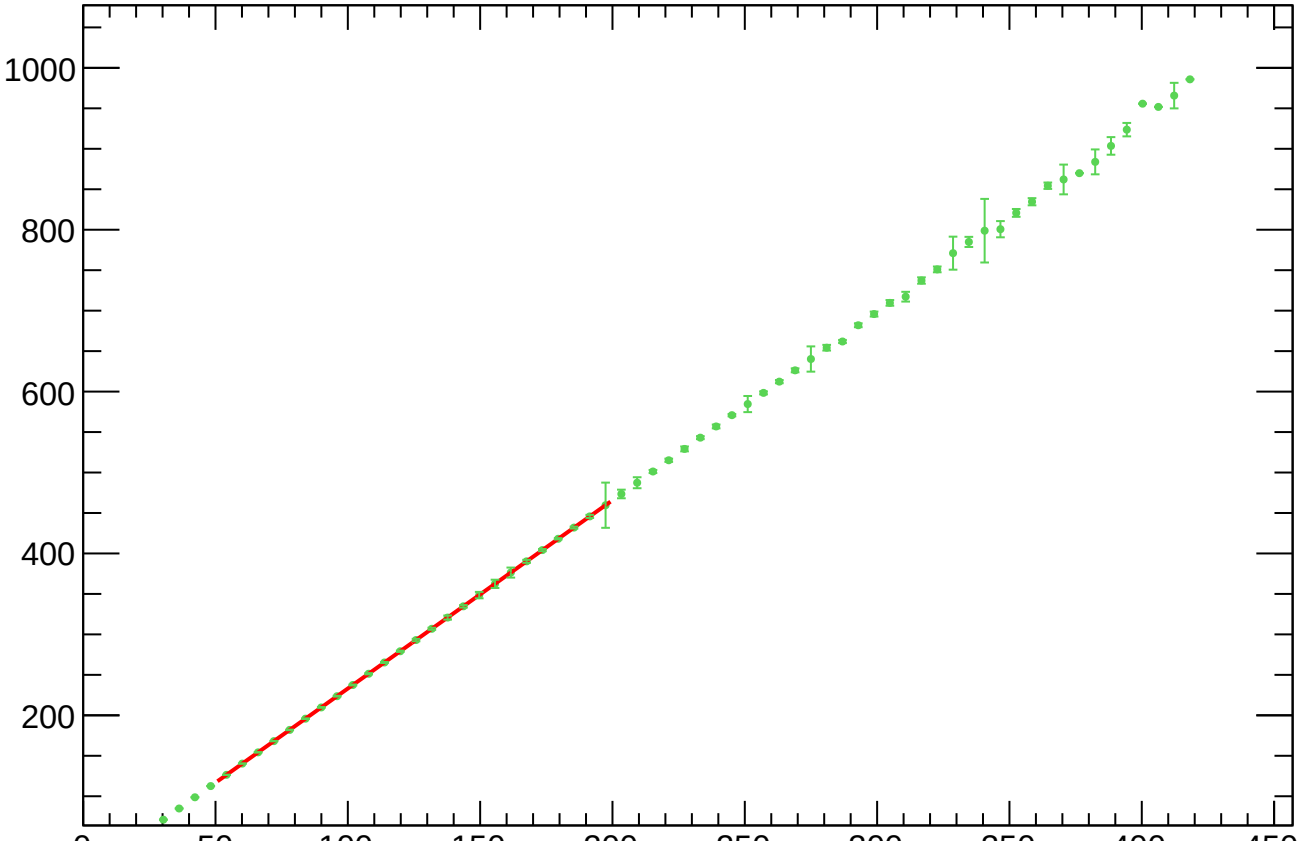
1000
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100
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300
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400
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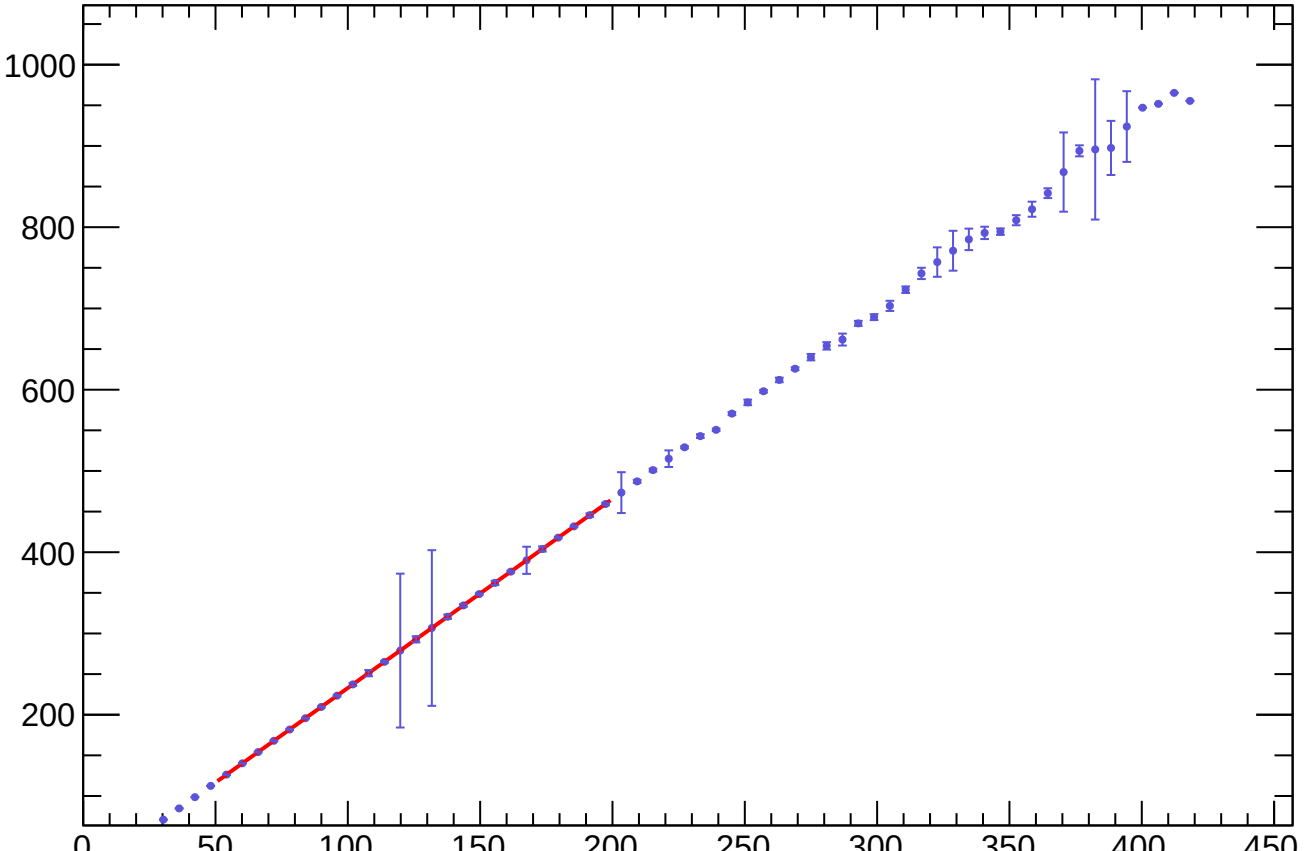
1000
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400
200
0
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100
150
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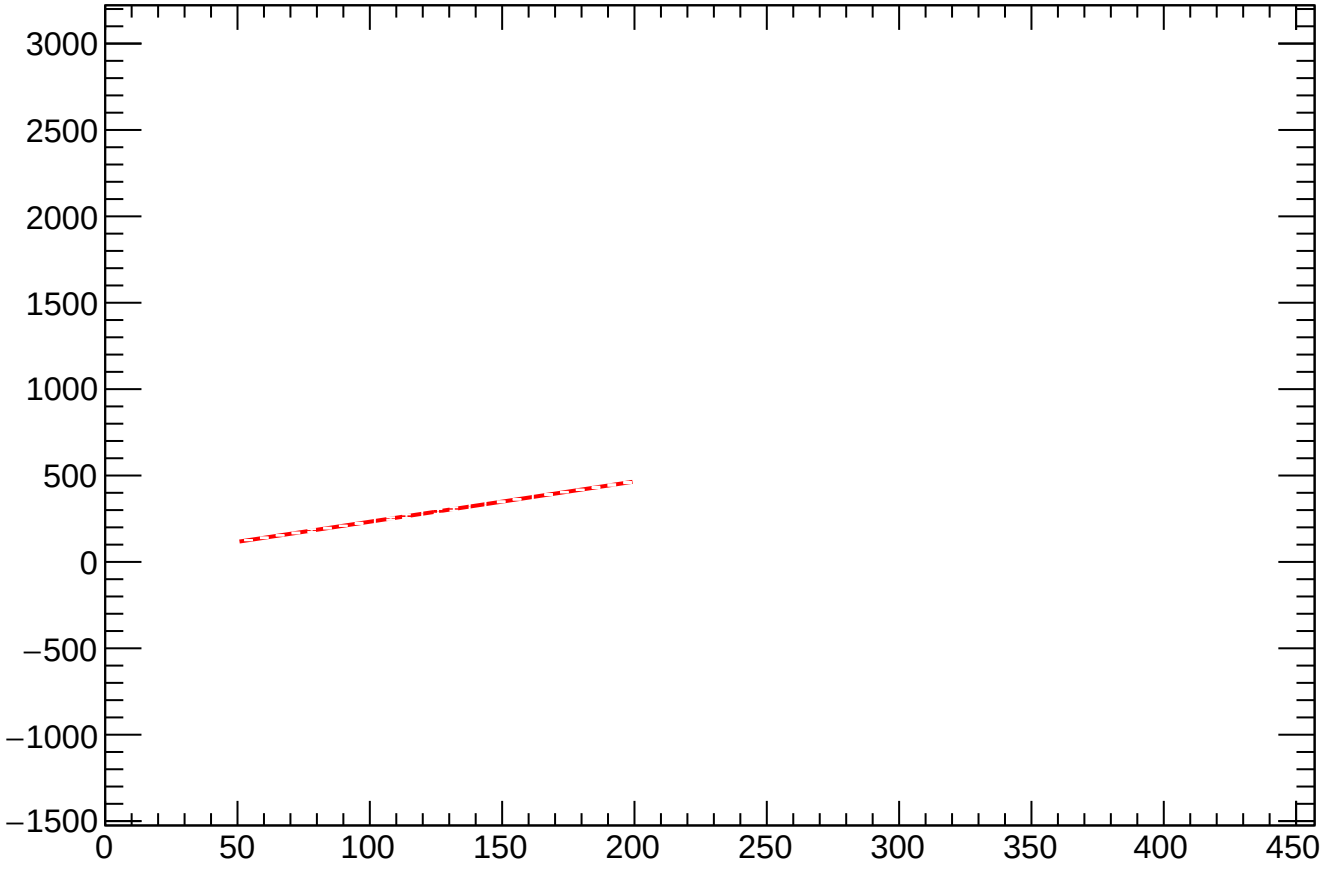
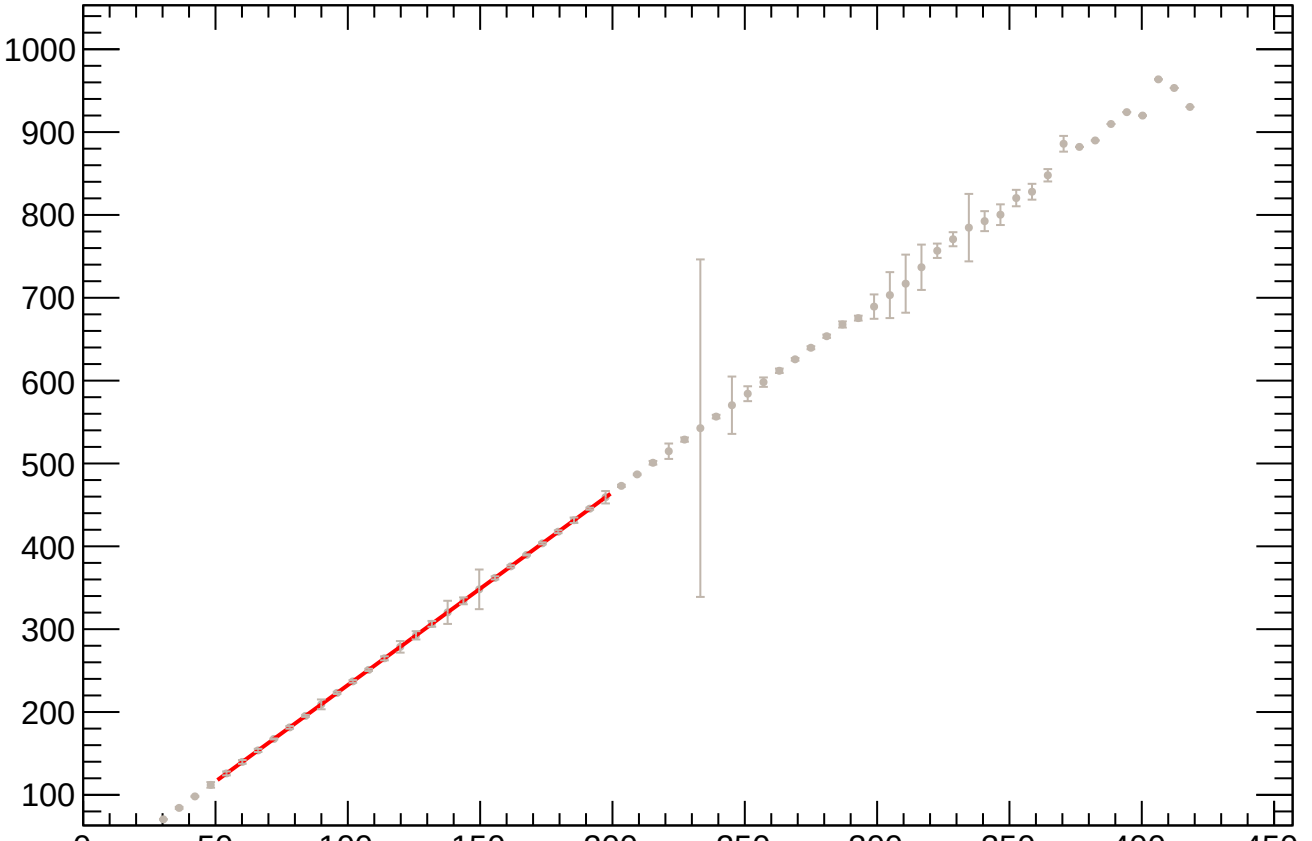
300
350
400
450


3000
2500
2000
1500
1000
500
0
−500
−1000
−1500
0
50
100
150
200
250
300
350
400
450


1000
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600
500
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200
100
0
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100
150
200
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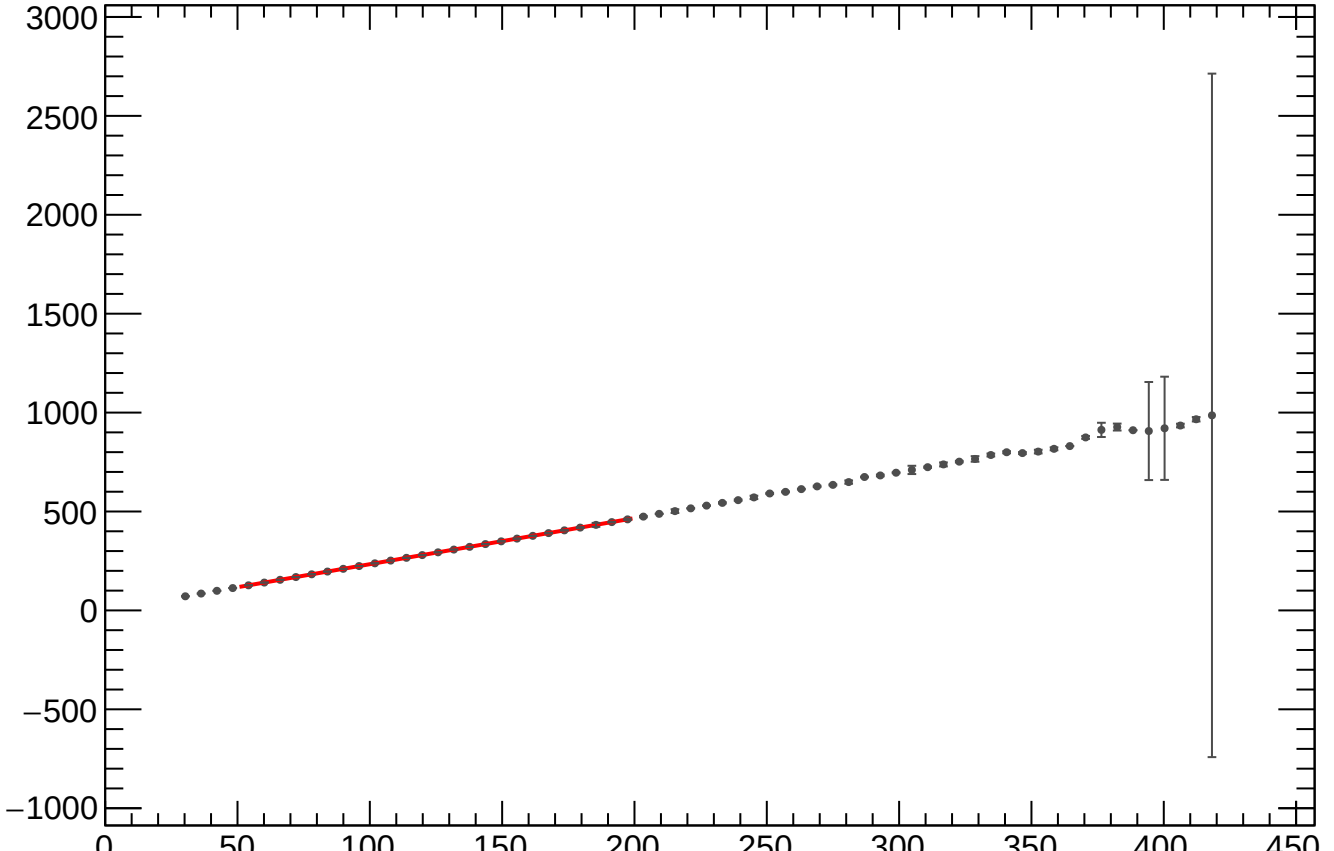
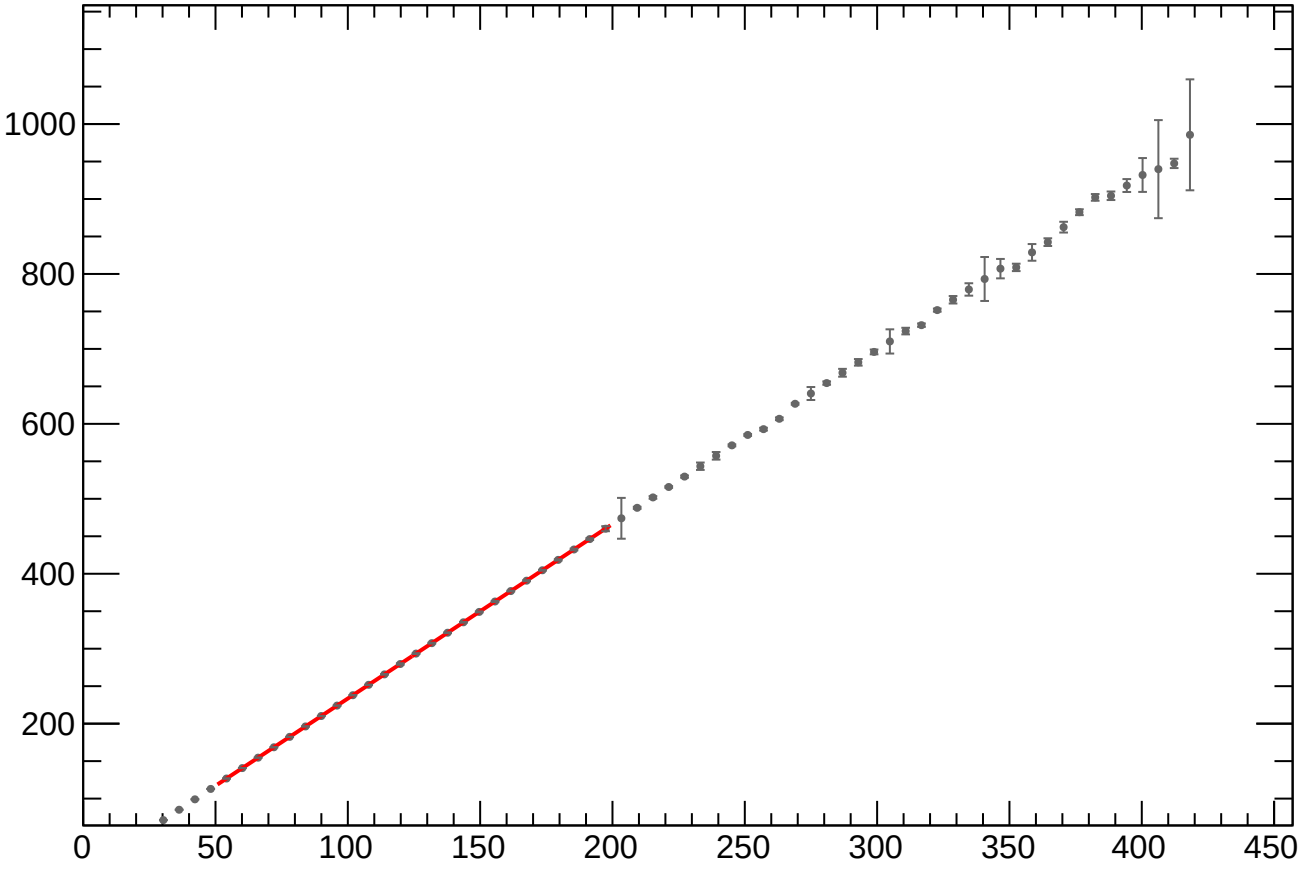
400
450


3000
2500
2000
1500
1000
500
0
−500
−1000
0
50
100
150
200
250
300
350
400
450


1000
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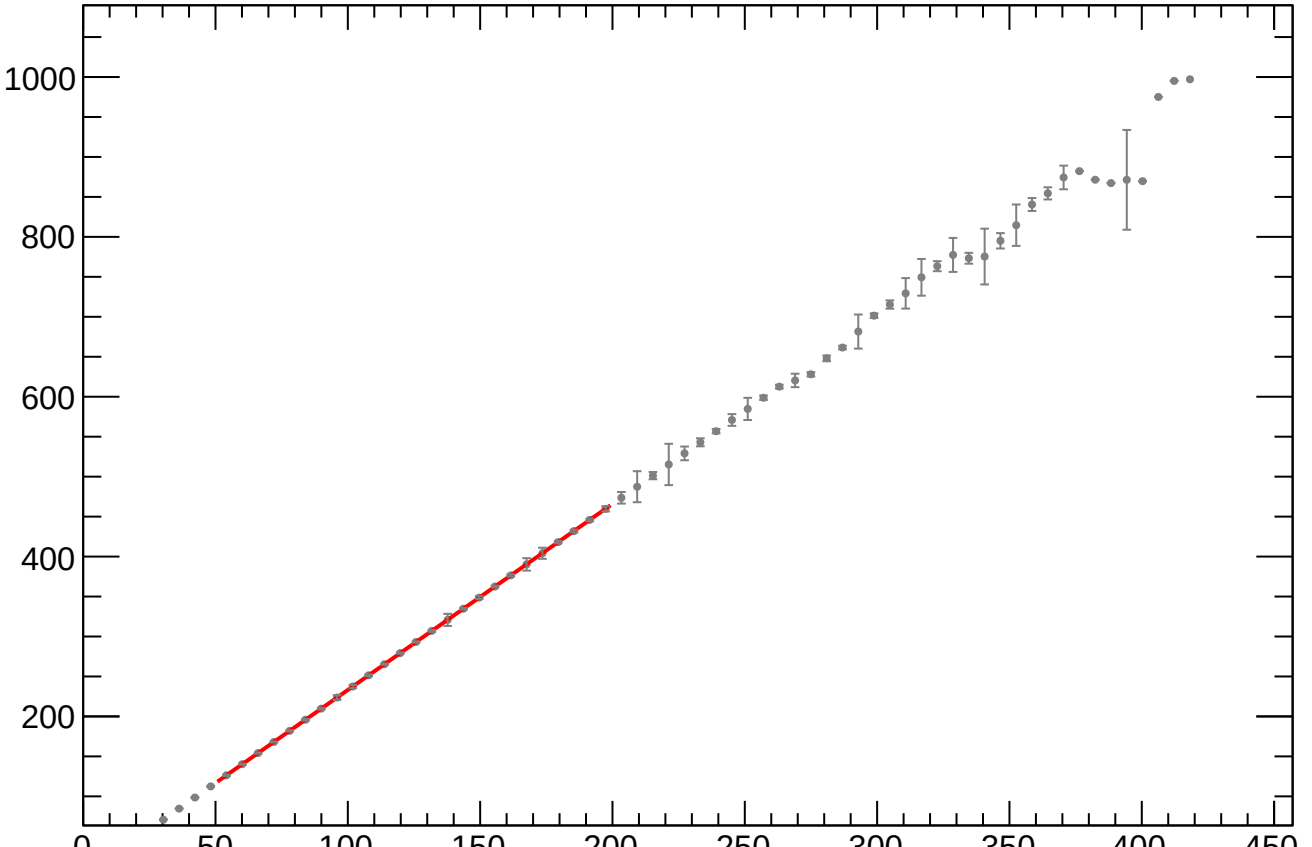
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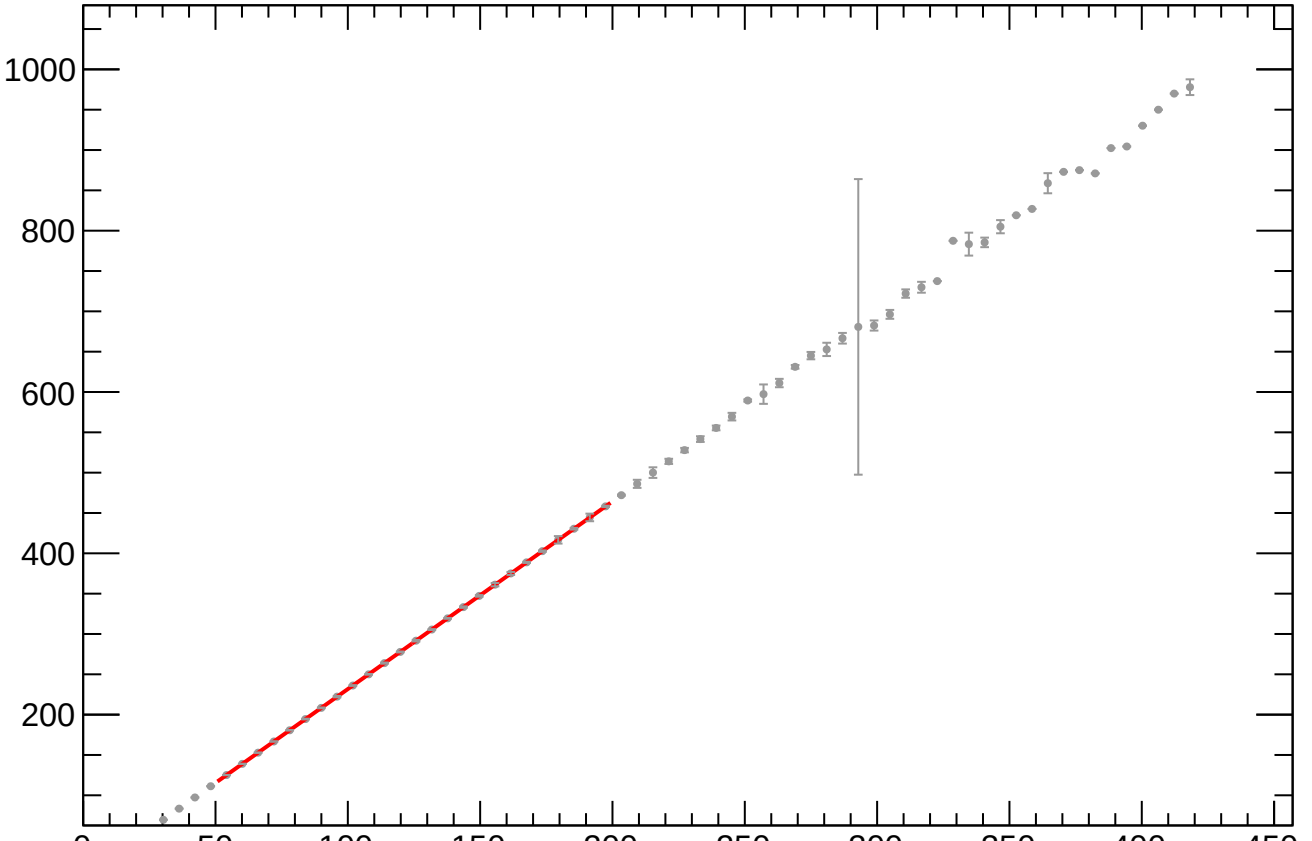
1000
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100
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400
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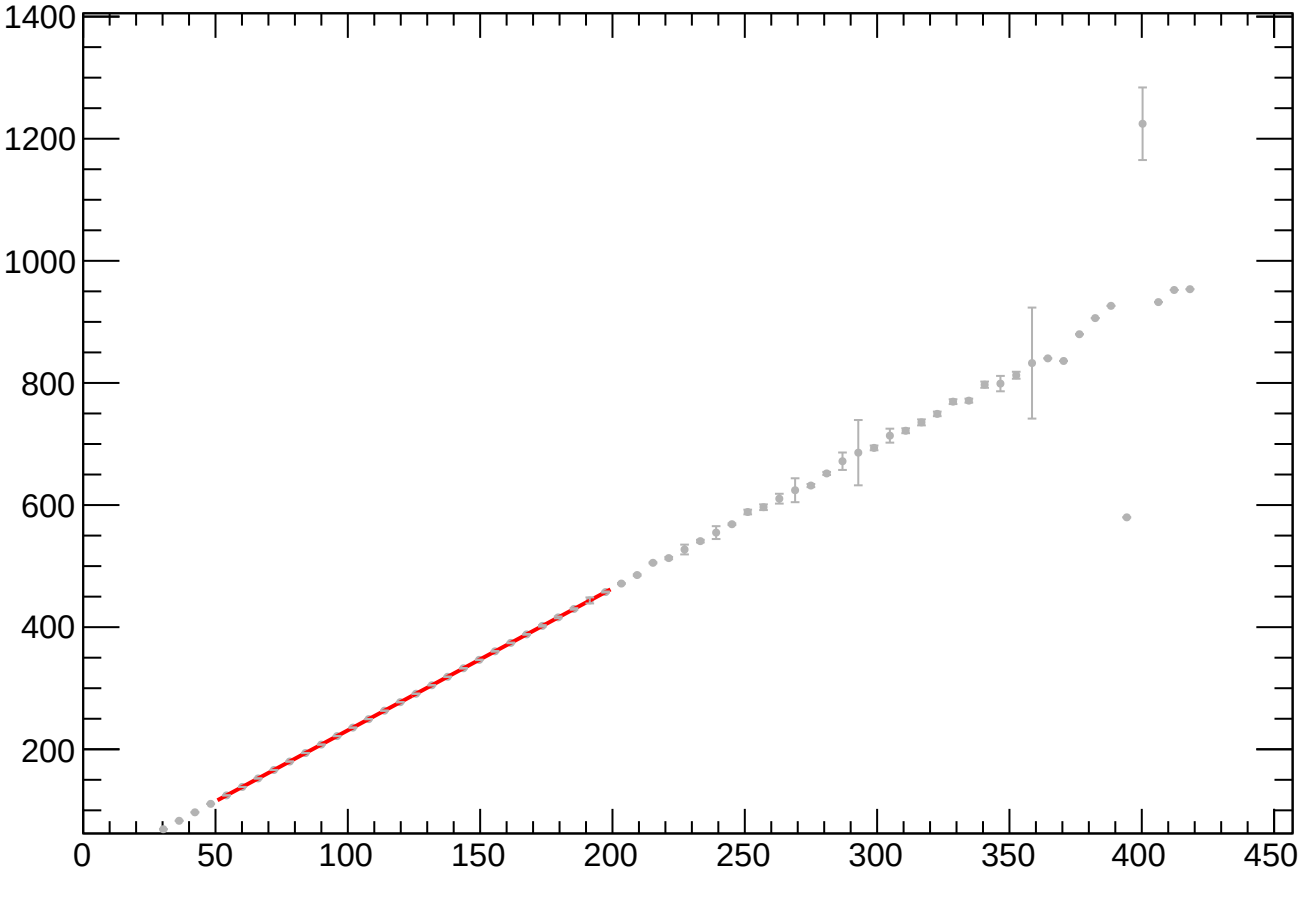
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1200
1000
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400
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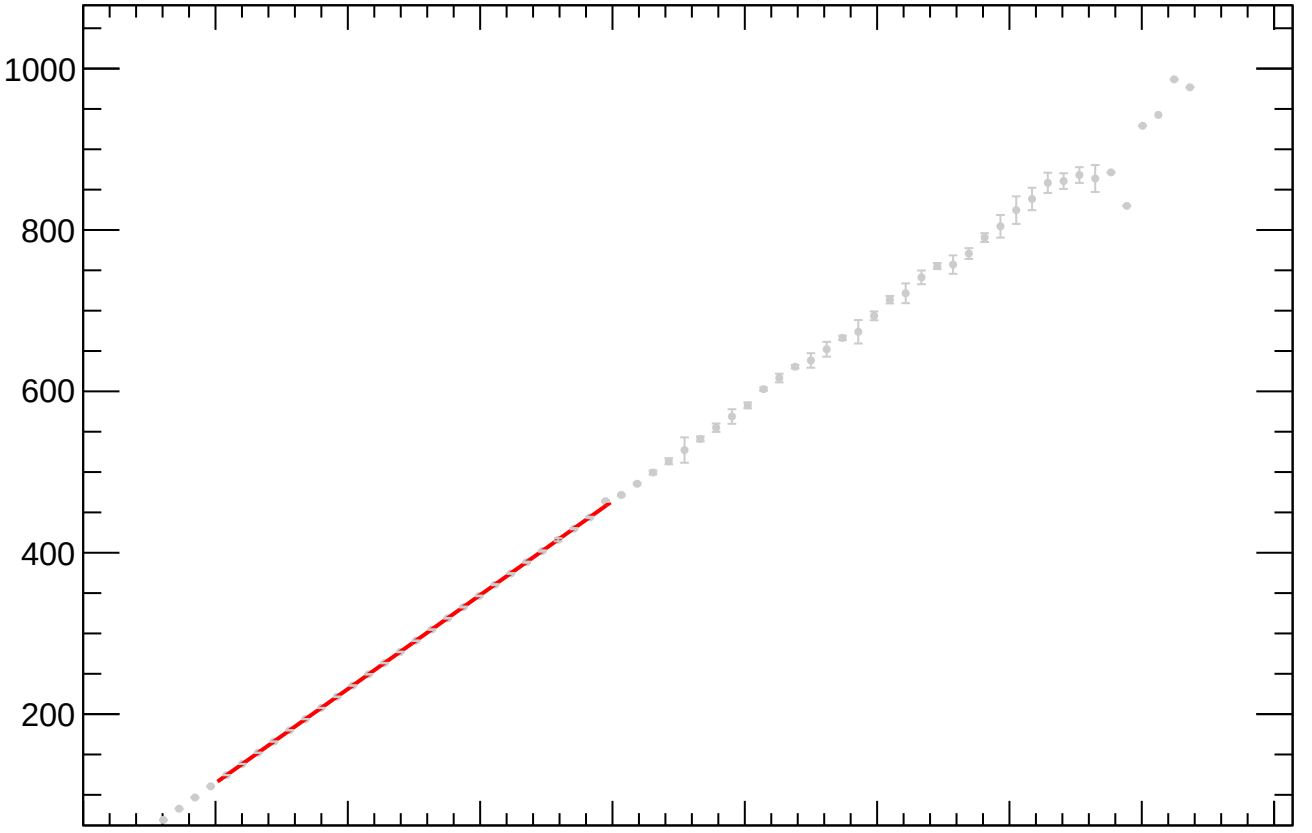
1000
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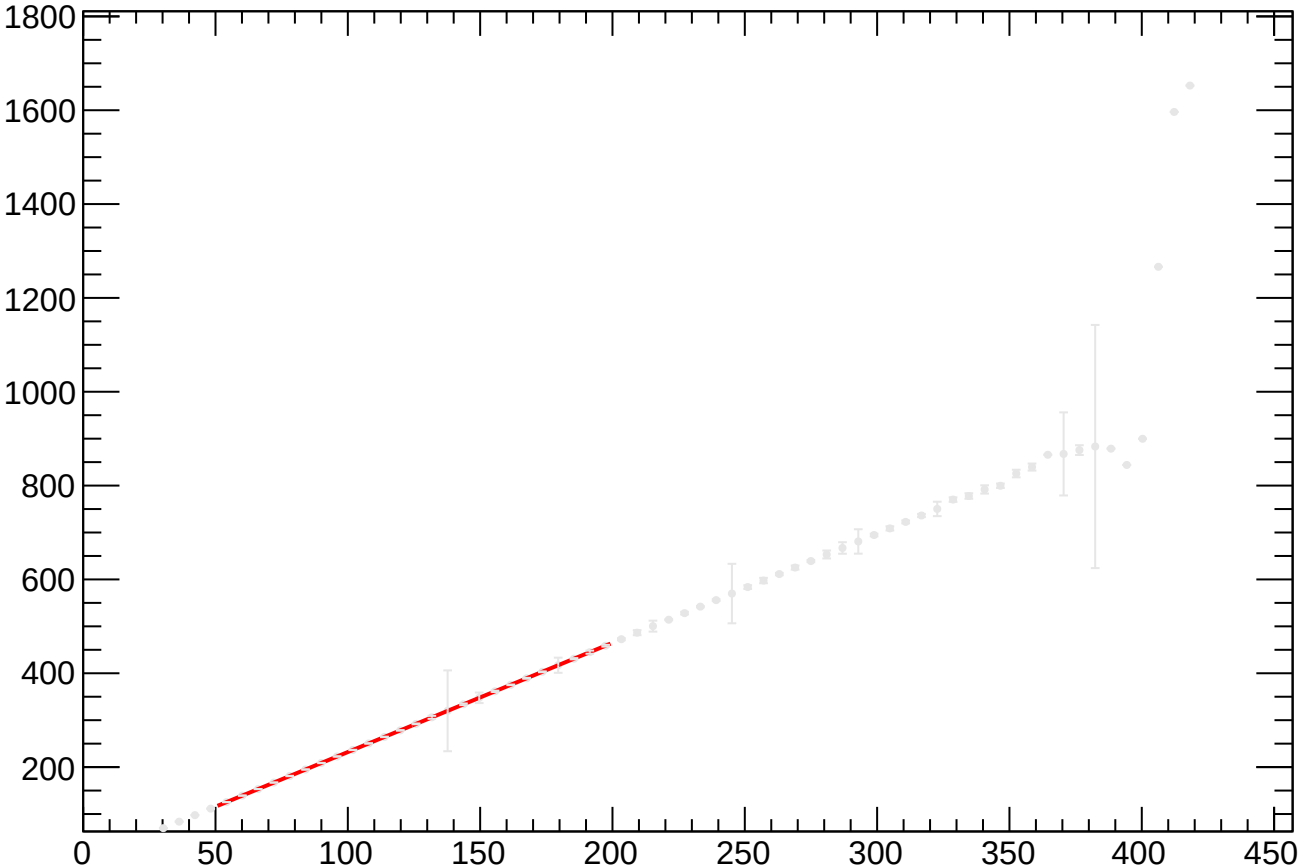
1800
1600
1400
1200
1000
800
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400
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0
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100
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200
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300
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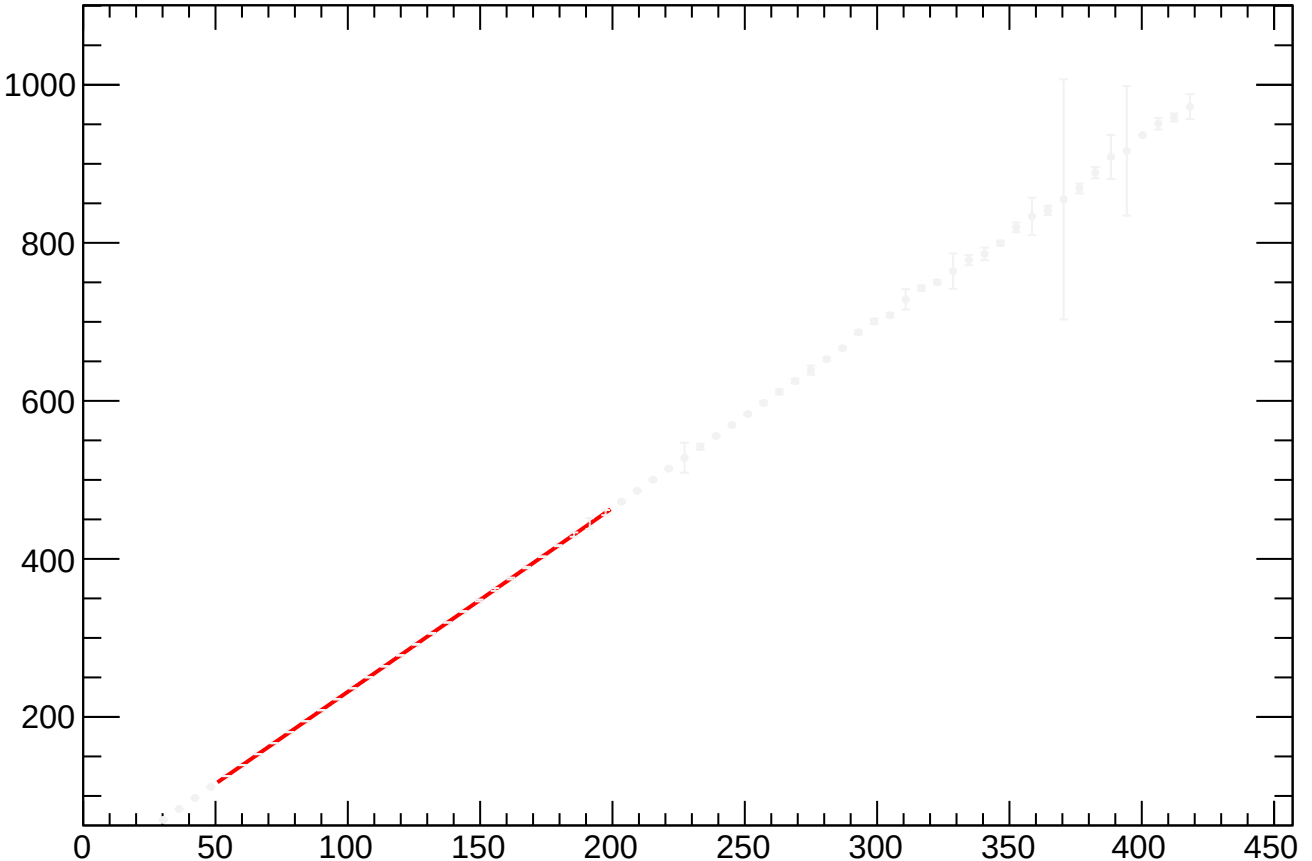
400
450


1000
800
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0
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300
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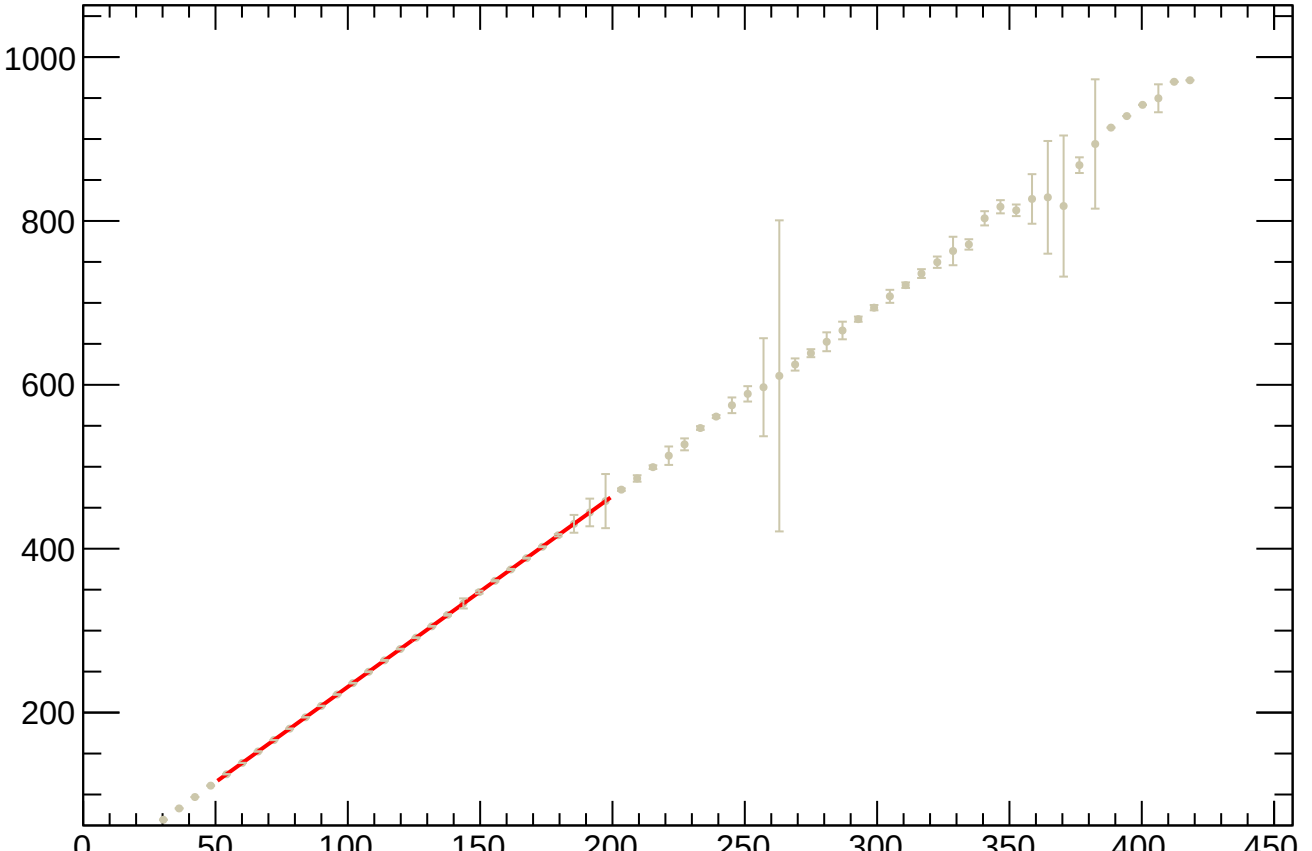
400
450


1000
800
600
400
200
0
50
100
150
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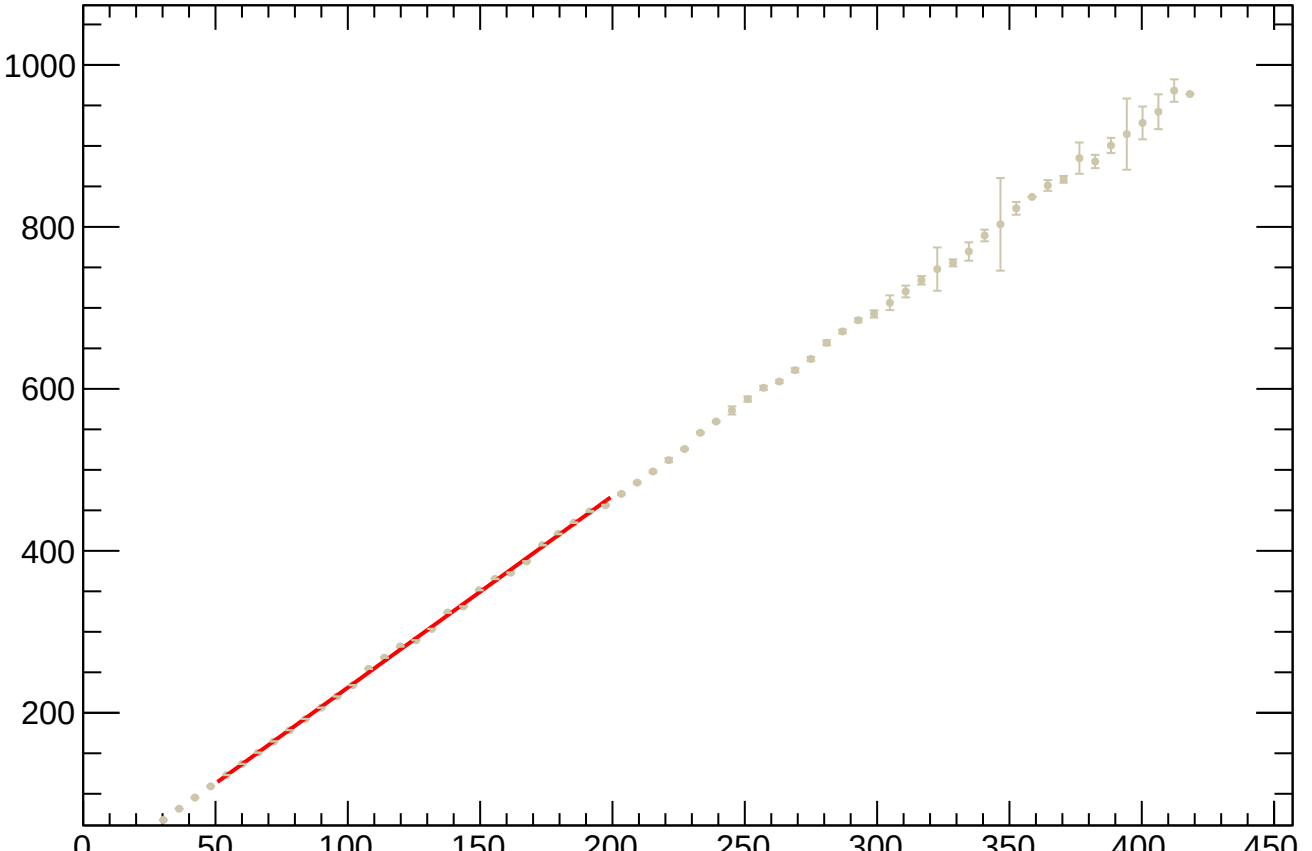
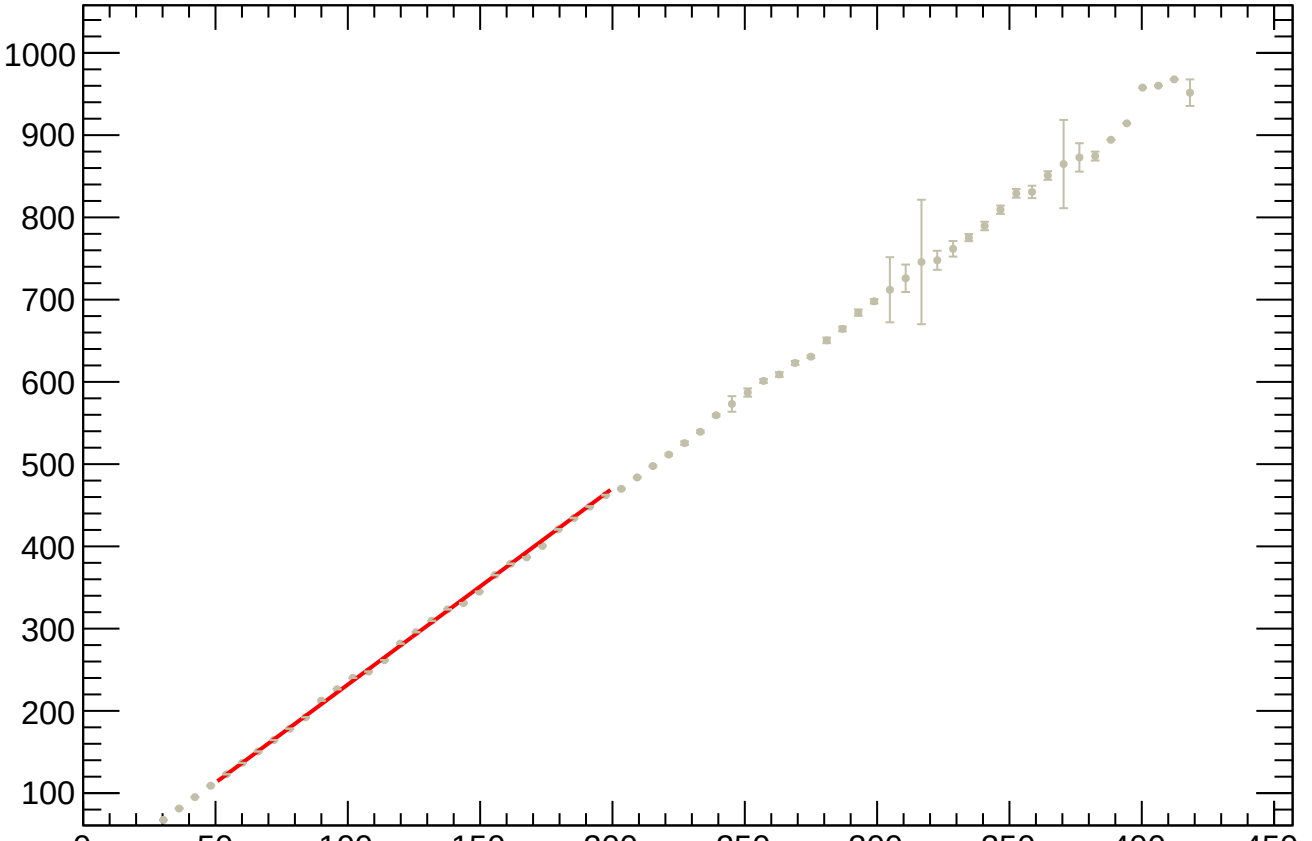
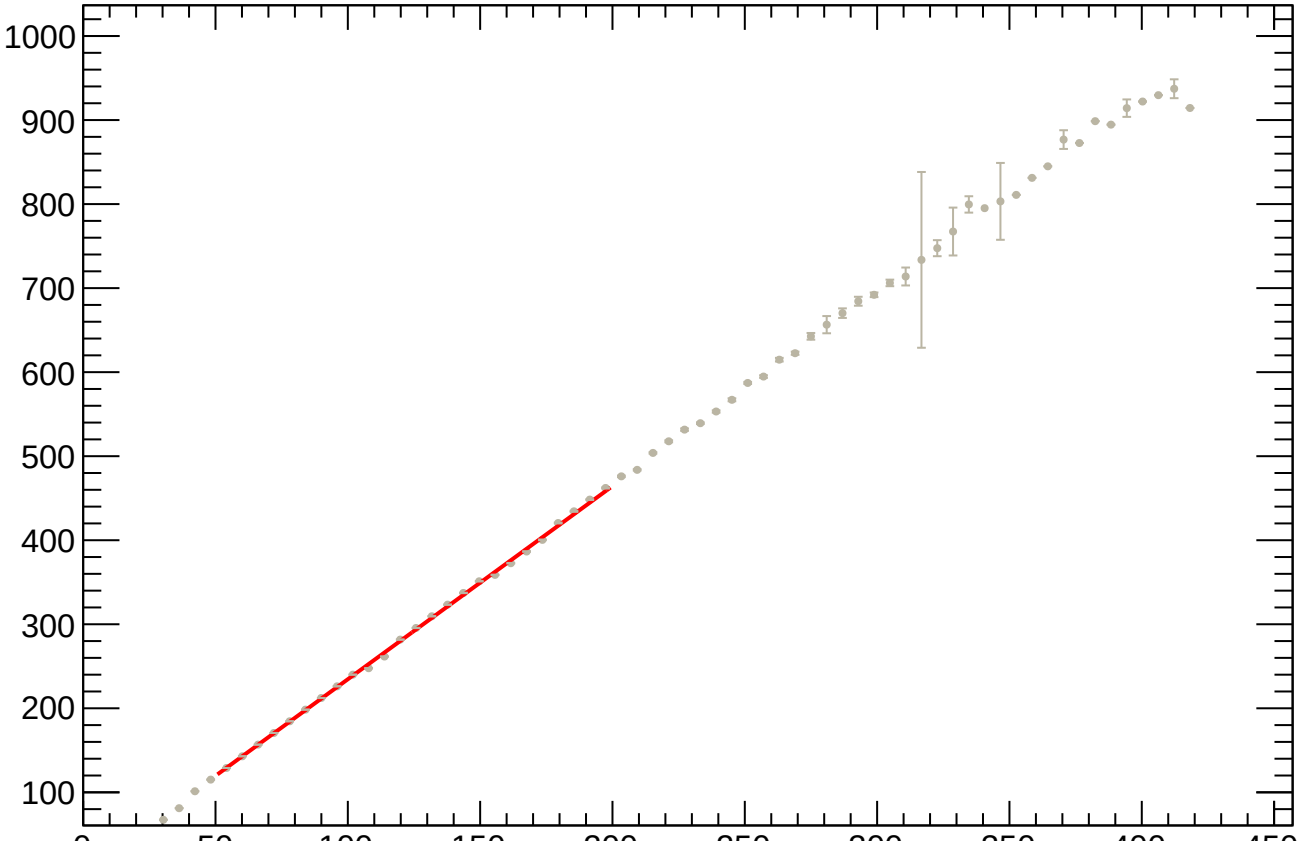
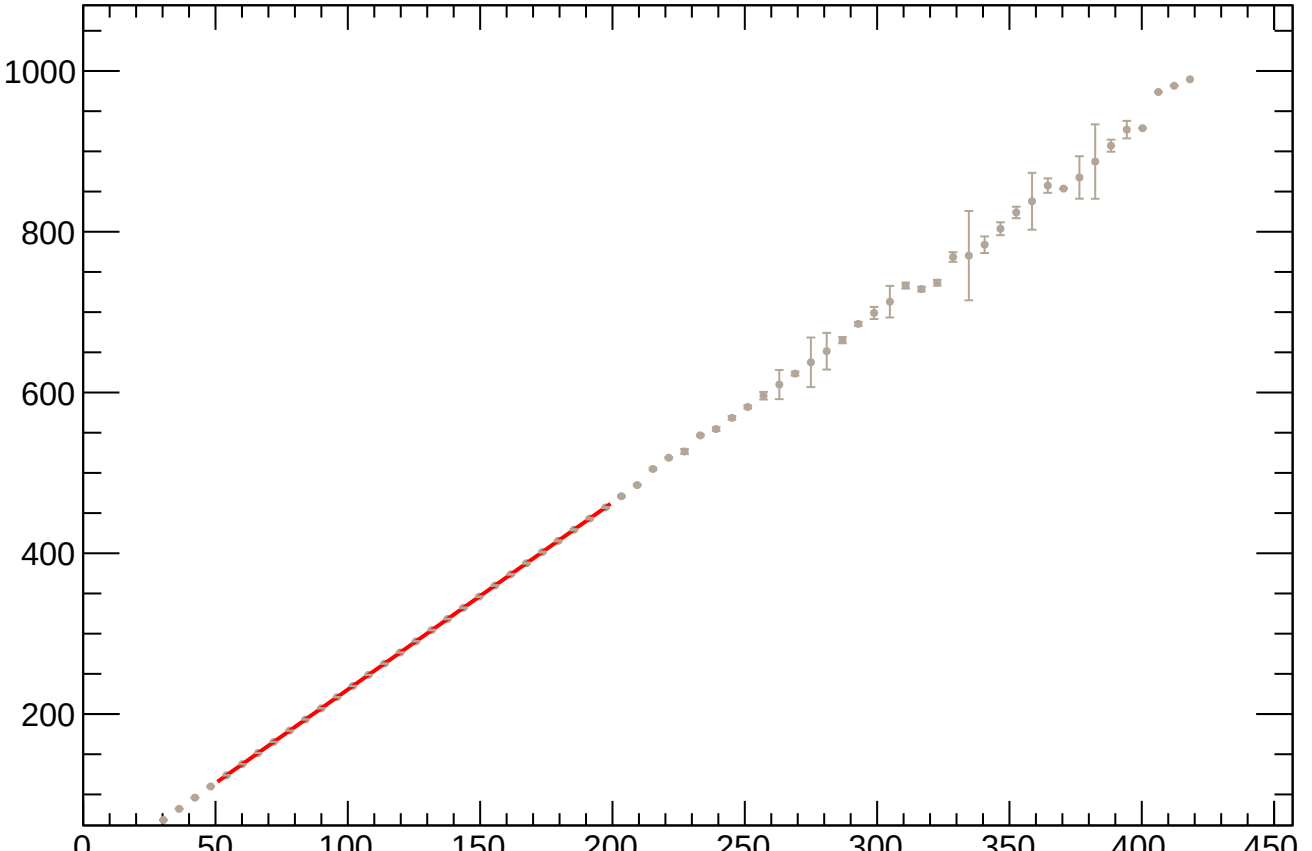
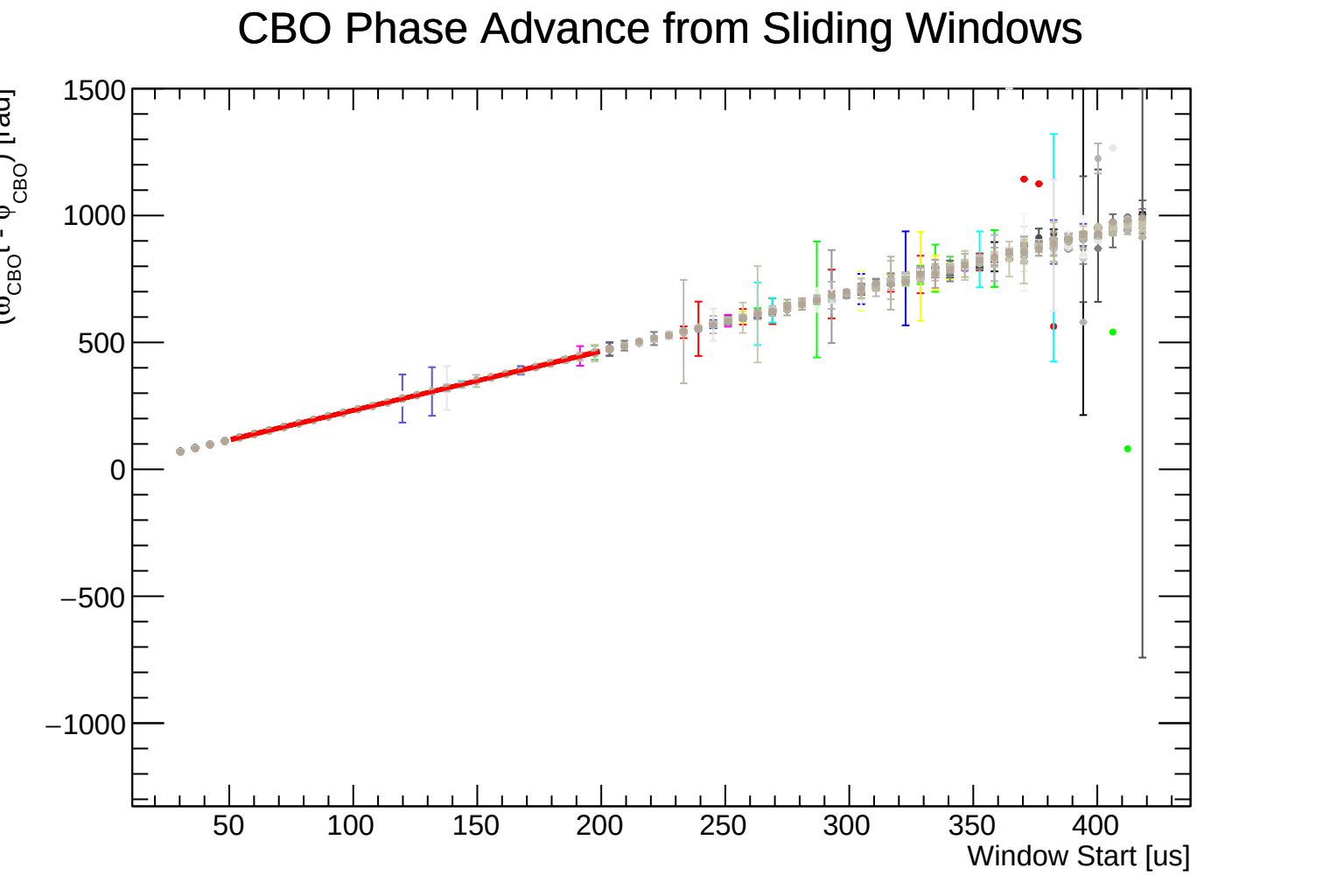
300
350
400
450

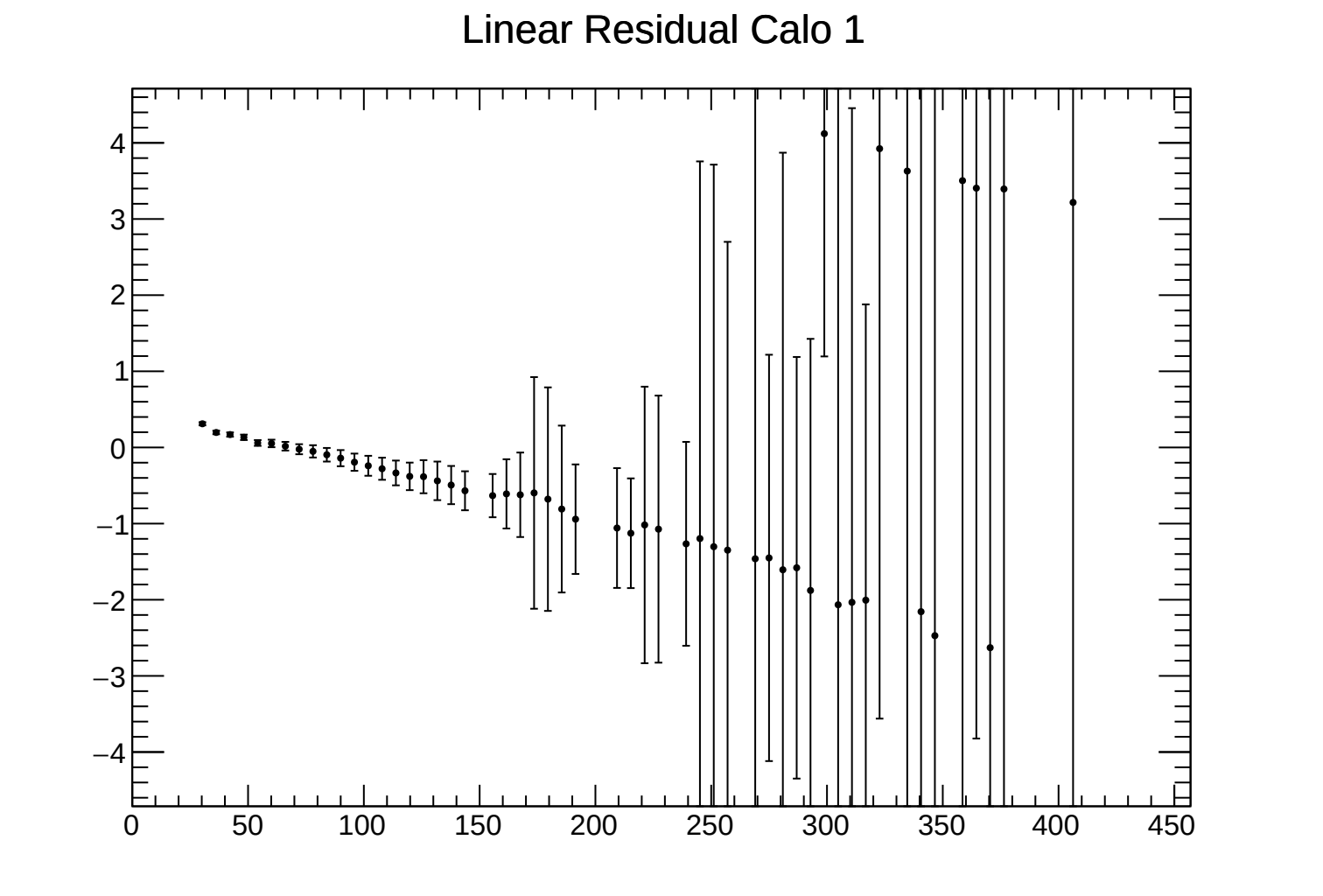

1000
800
600
400
200
0
50
100
150
200
250
300
350
400
450

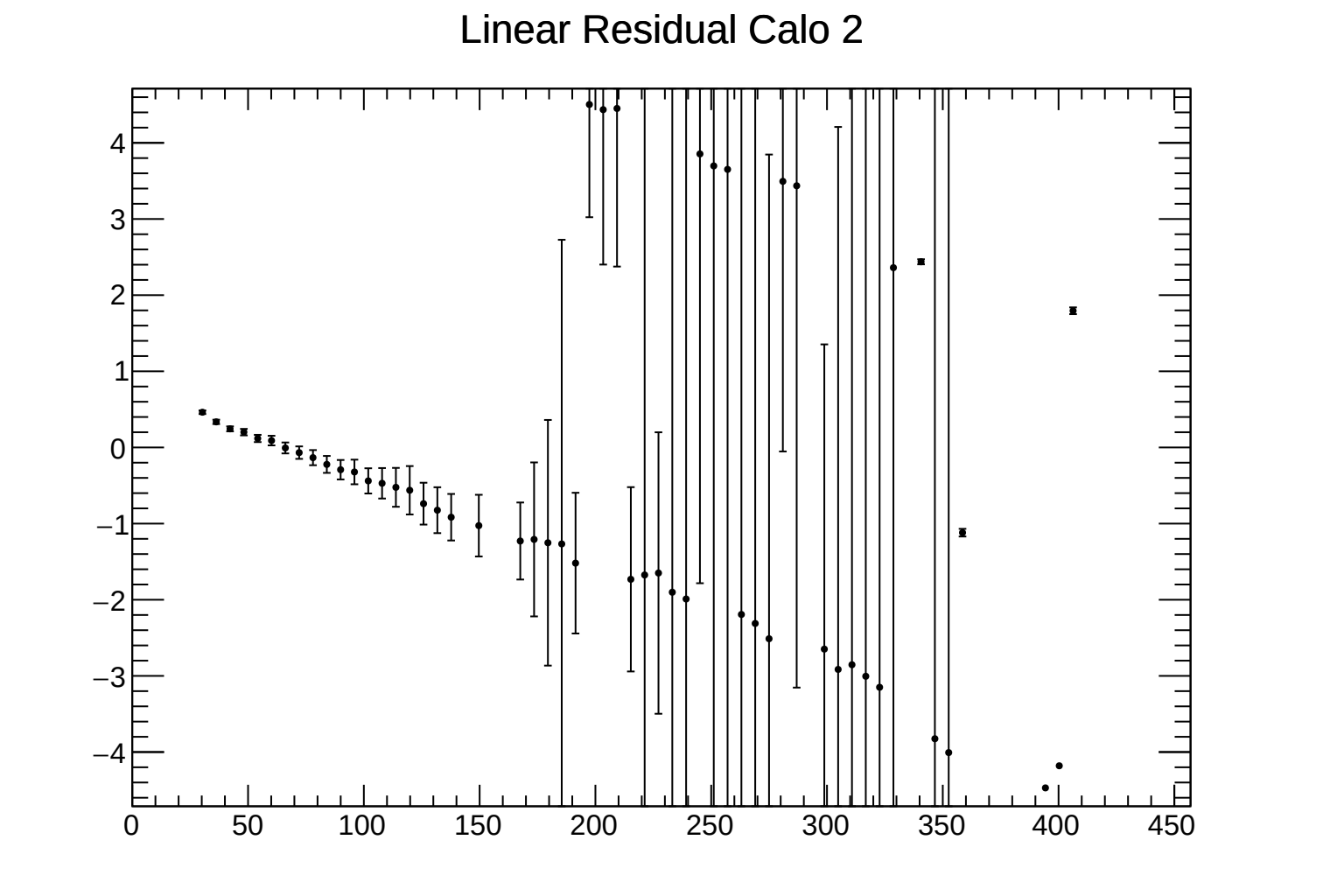

1000
900
800
700
600
500
400
300
200
100
0
50
100
150
200
250
300
350
400
450

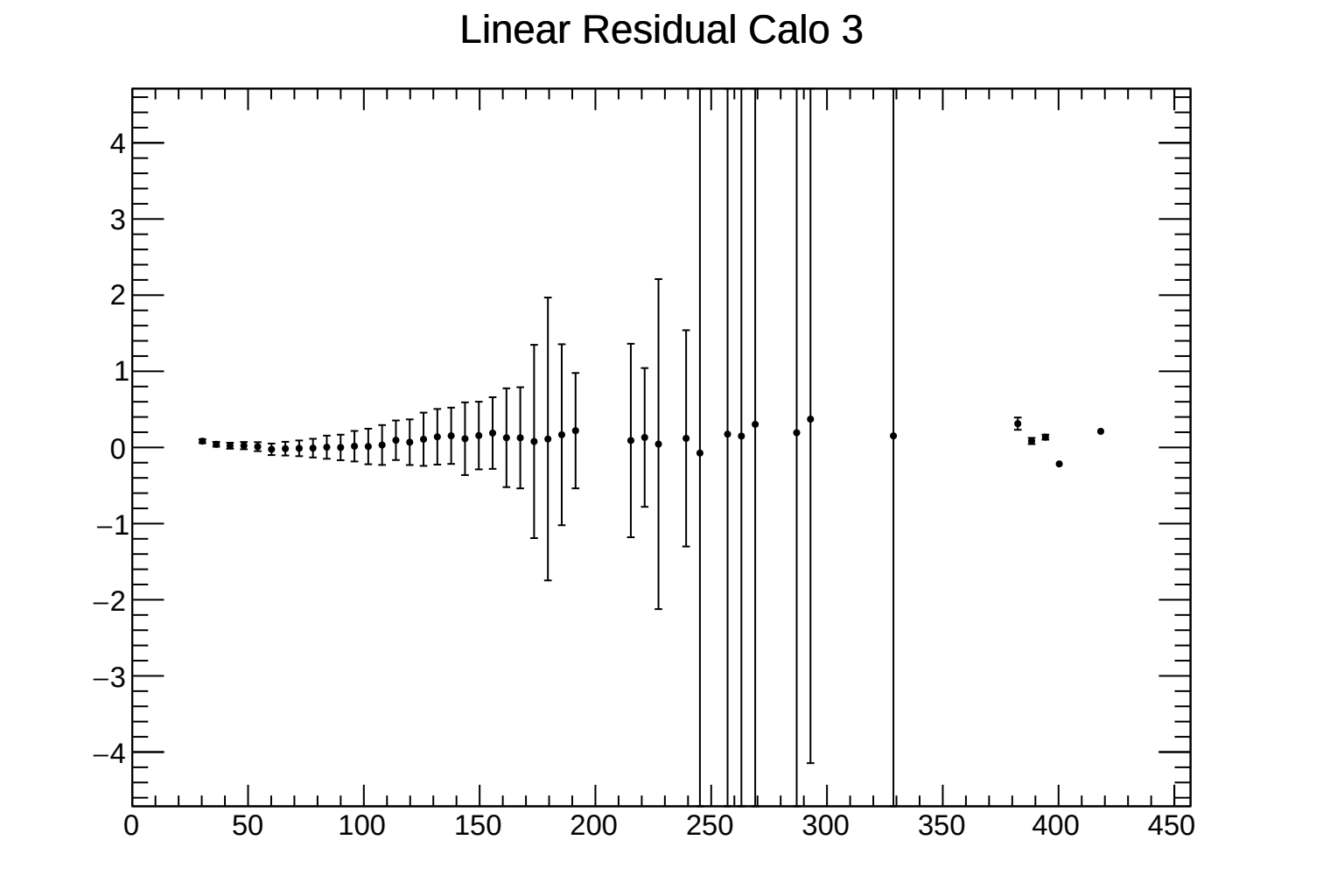

1000
900
800
700
600
500
400
300
200
100
0
50
100
150
200
250
300
350
400
450

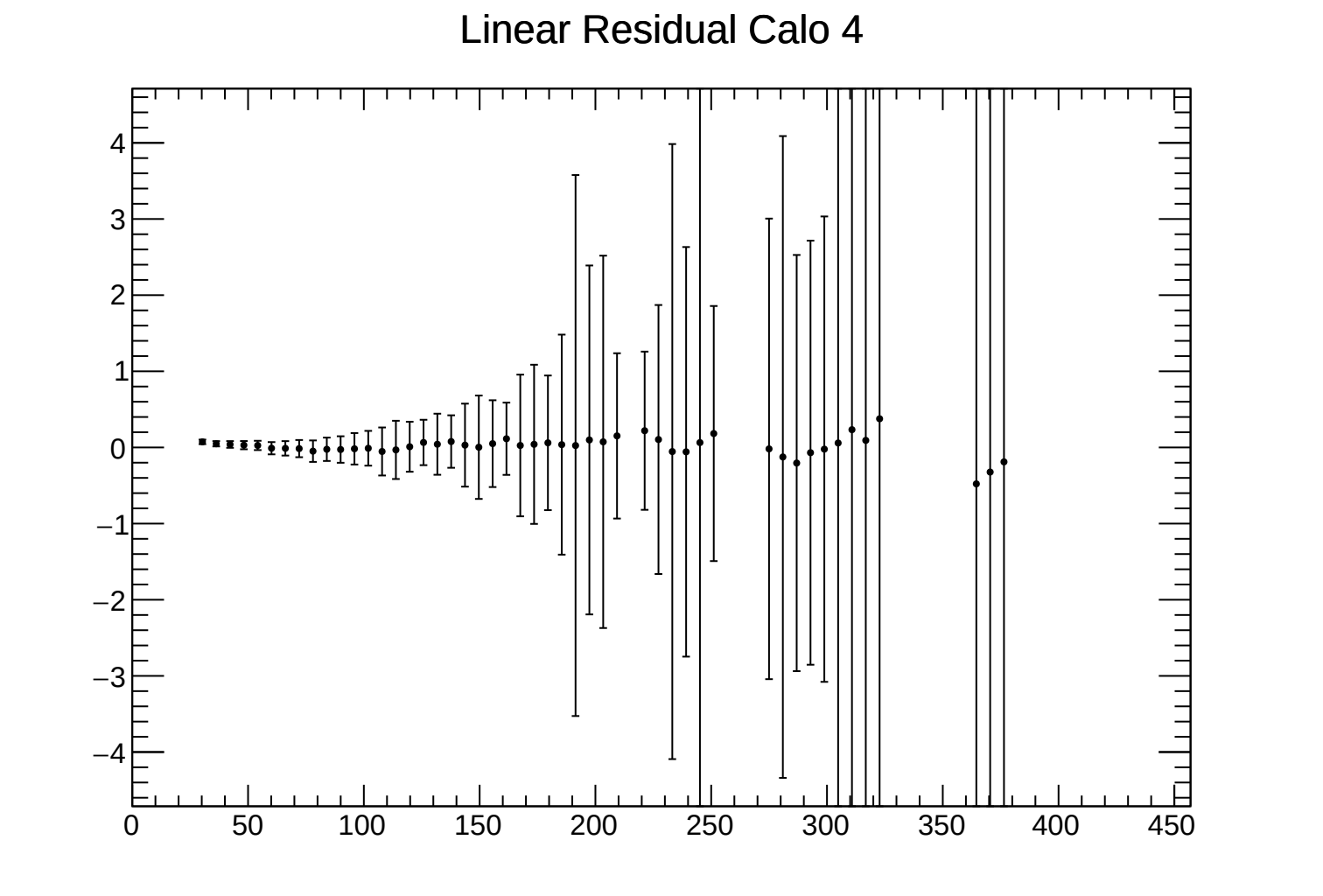

1000
800
600
400
200
0
50
100
150
200
250
300
350
400
450


CBO Phase Advance from Sliding Windows
$(\omega_{CBO}t - \psi_{CBO})$ [rad]
1500
1000
500
0
−500
−1000
50
100
150
200
250
300
350
400
Window Start [us]

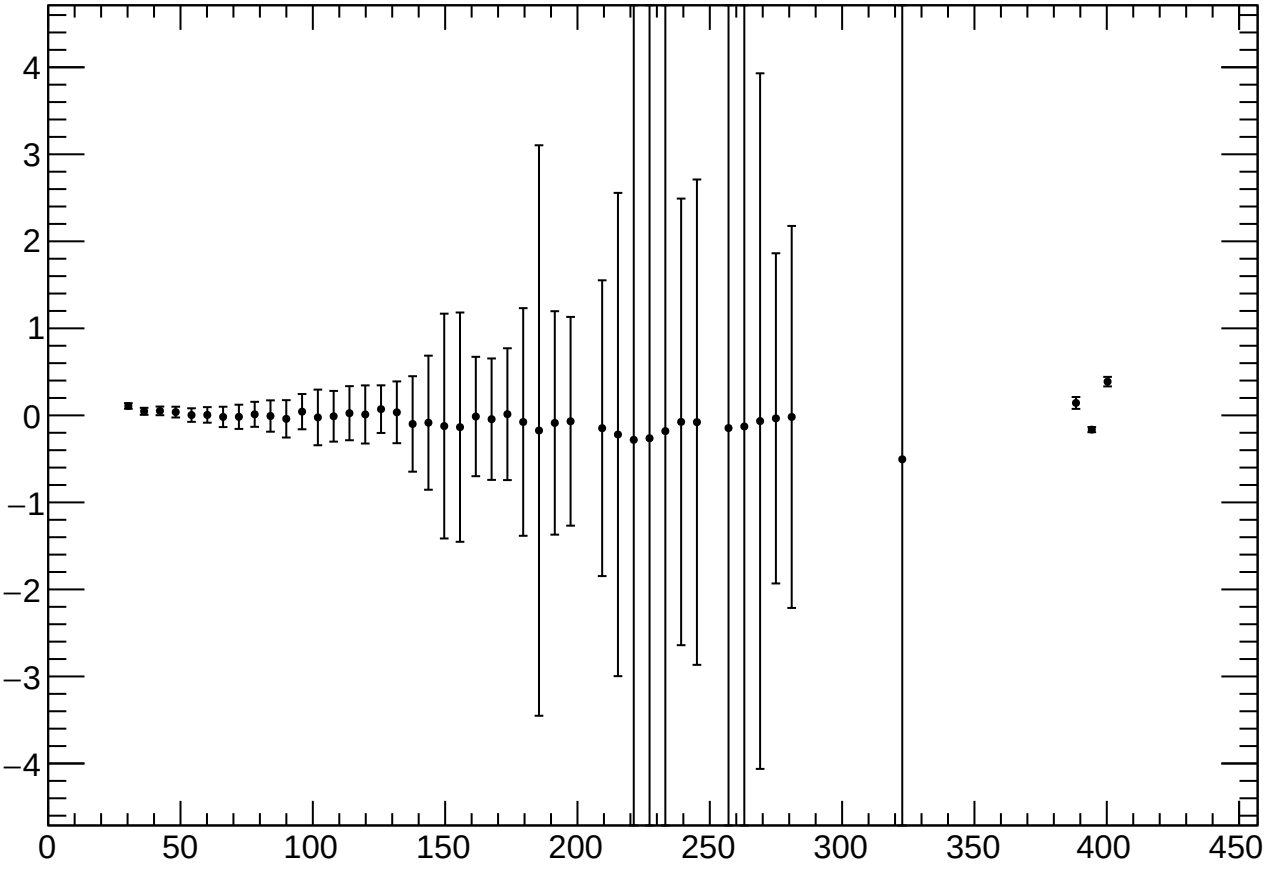

Linear Residual Calo 1
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450

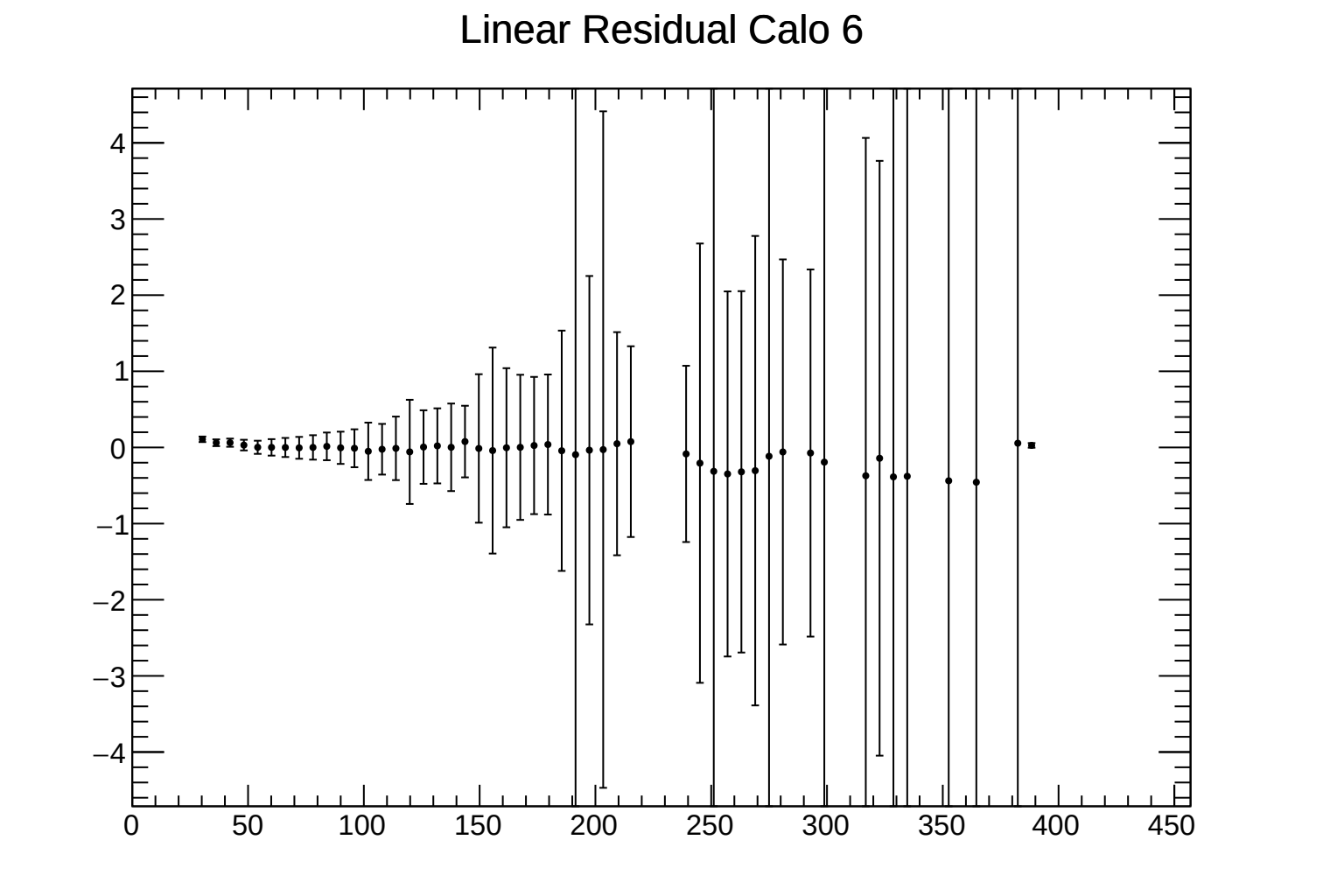

Linear Residual Calo 2
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450

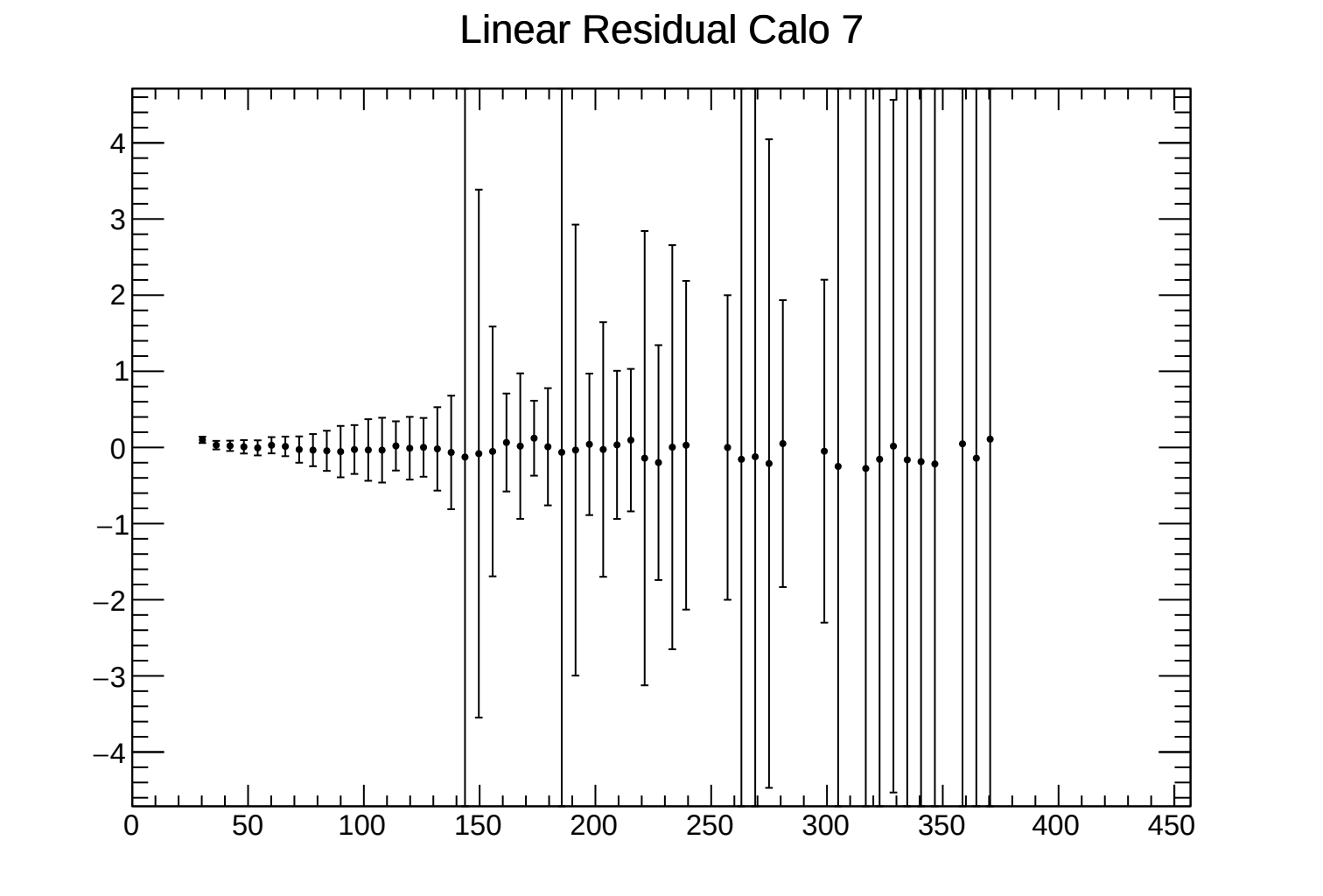

Linear Residual Calo 3
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450

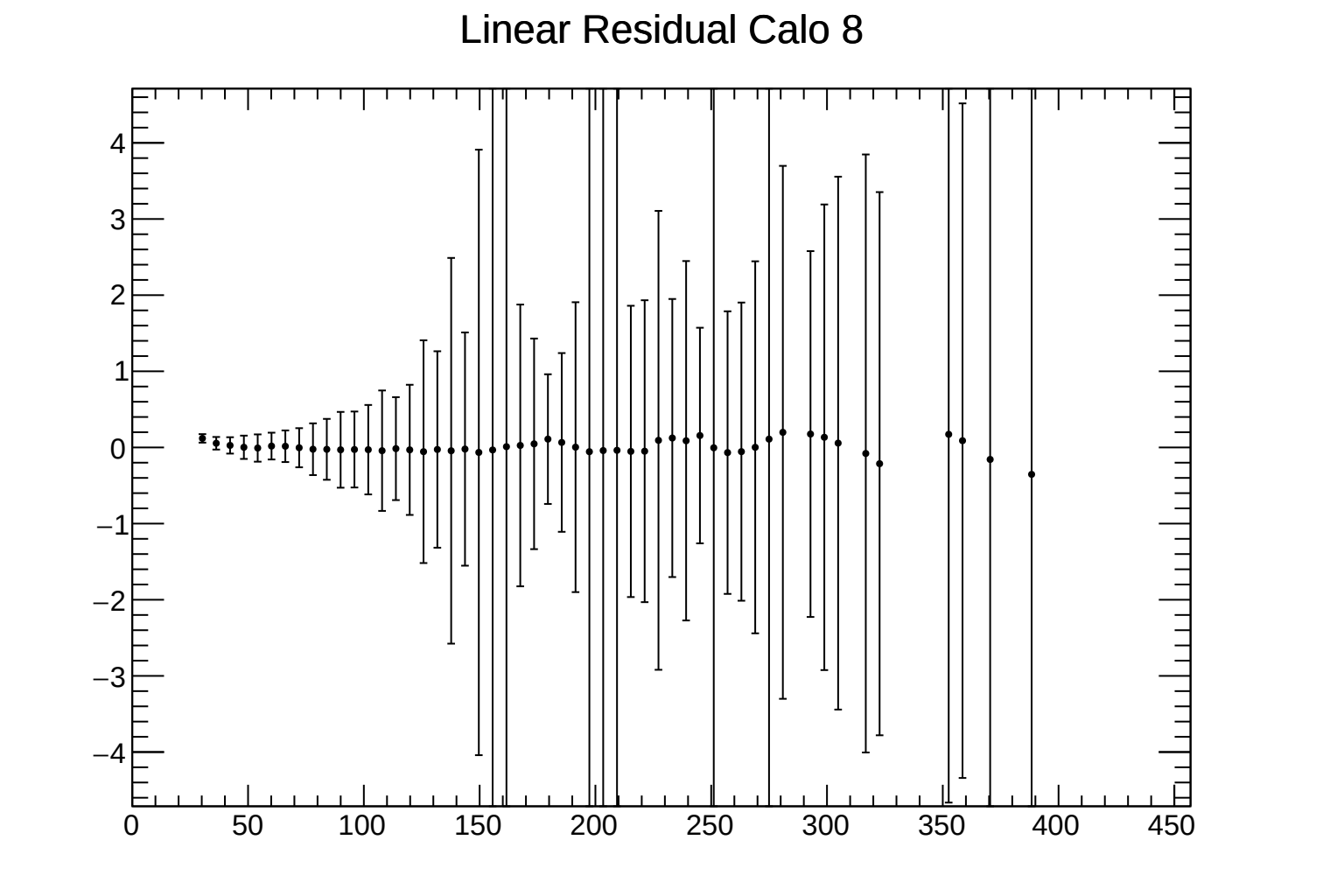

Linear Residual Calo 4
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450

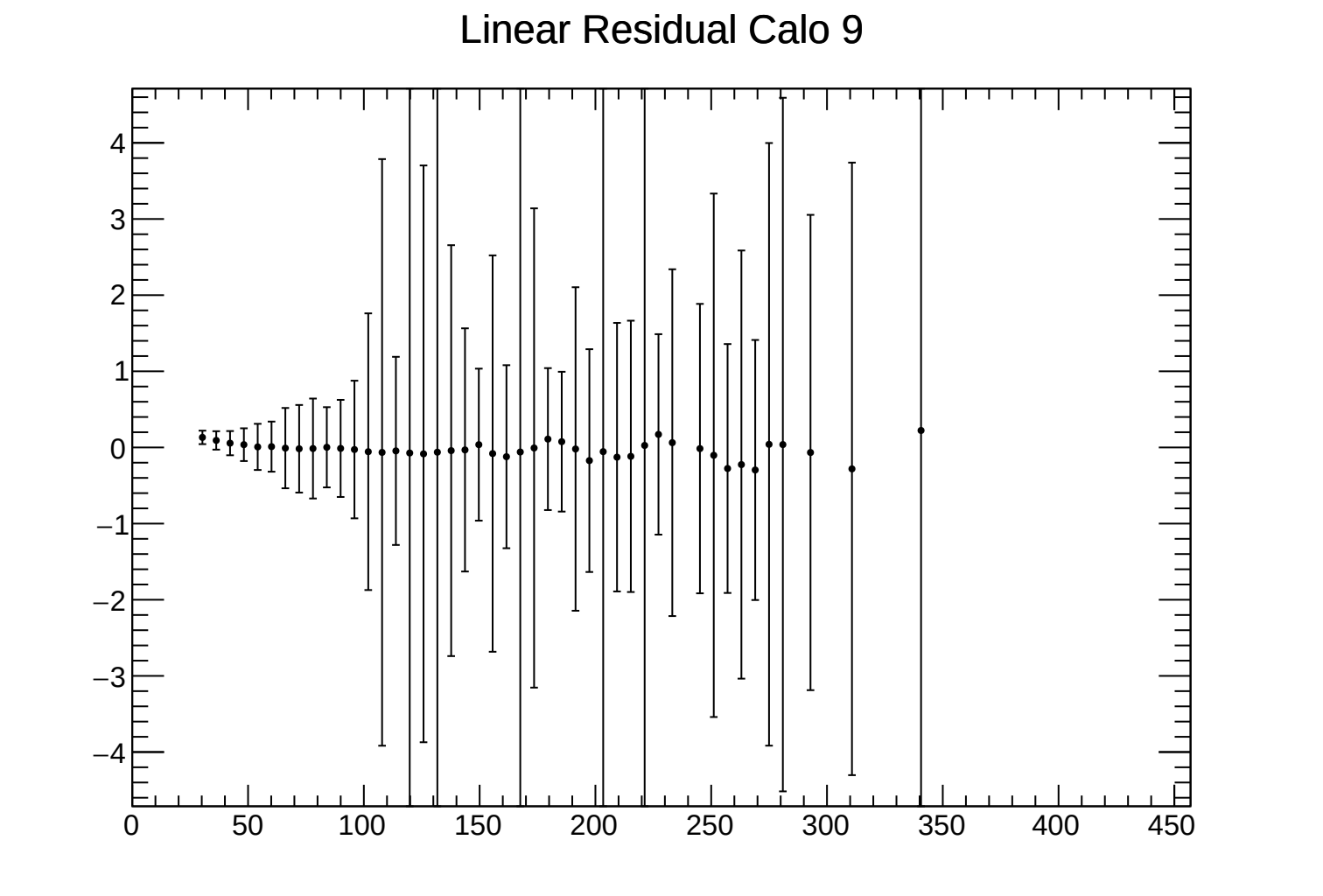
Linear Residual Calo 5

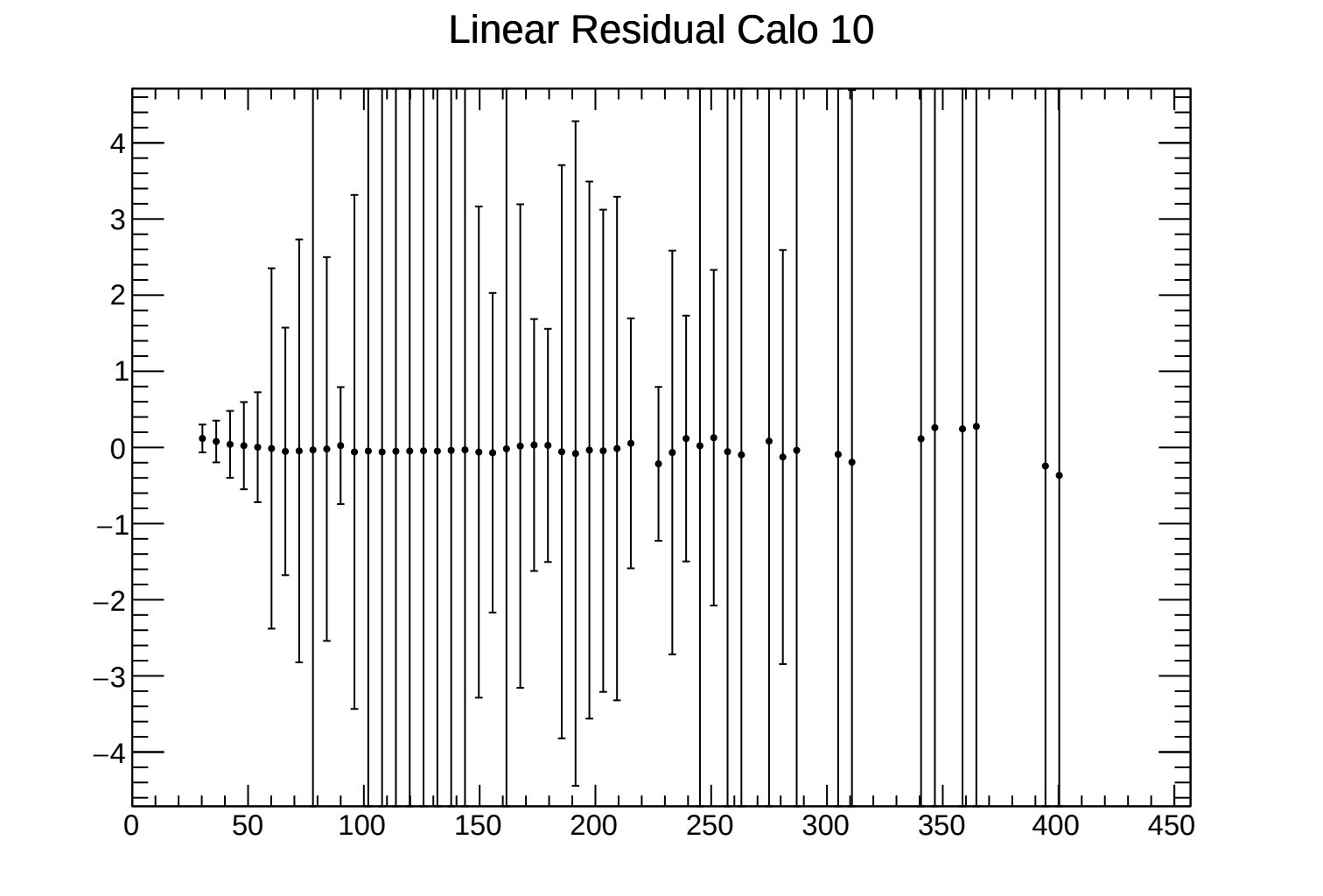


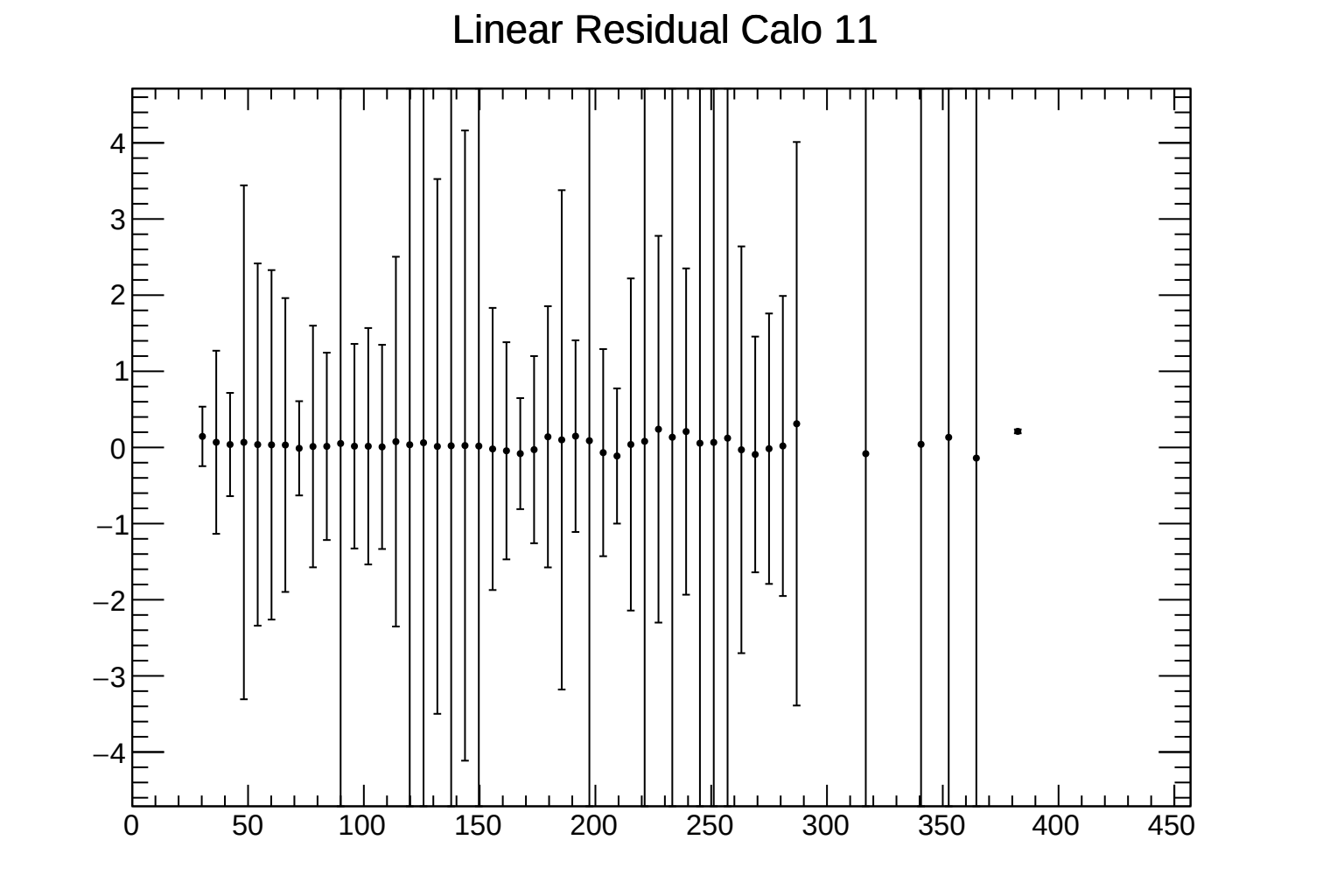

Linear Residual Calo 6
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450

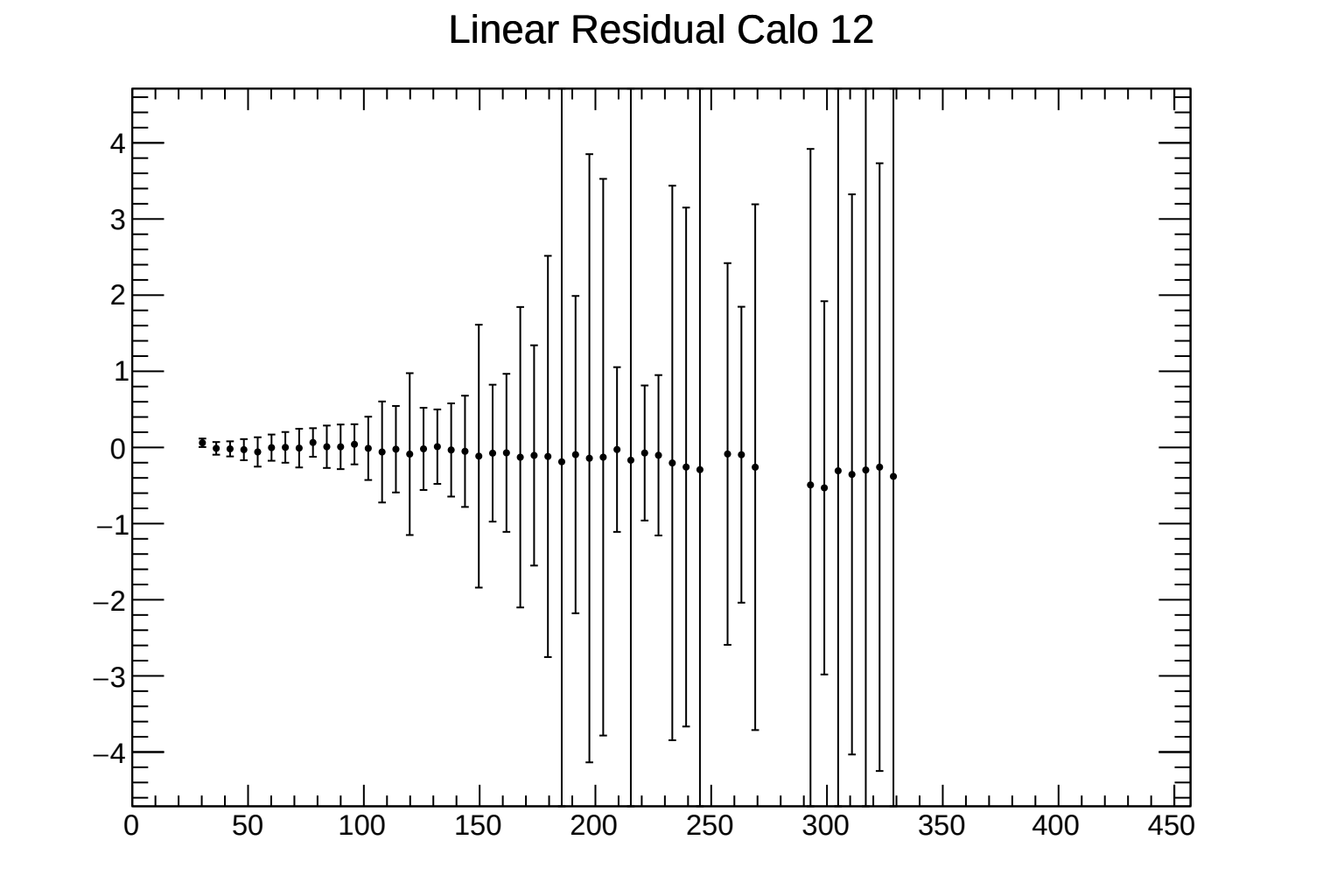

Linear Residual Calo 7
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450

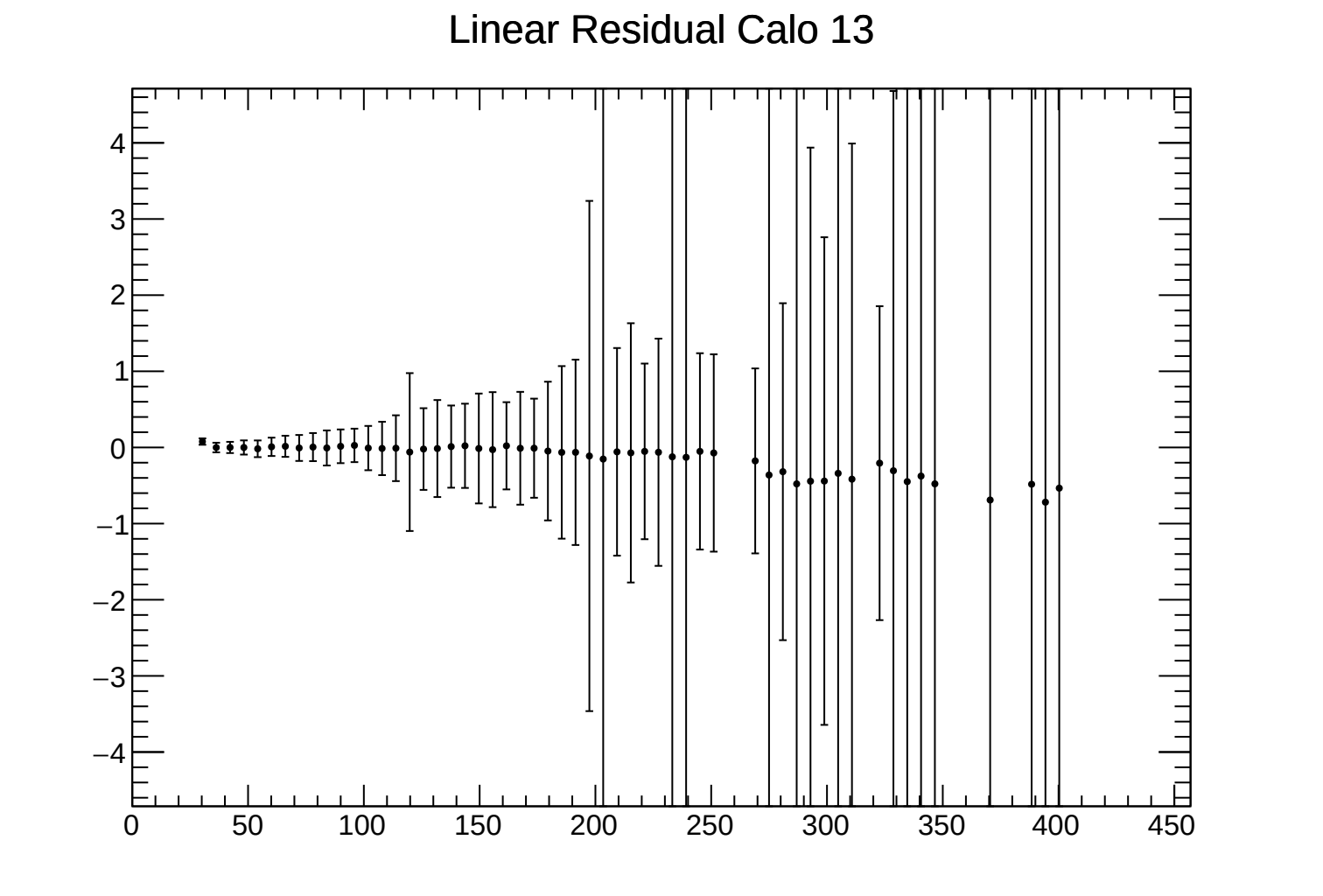

Linear Residual Calo 8
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450


Linear Residual Calo 9
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450


Linear Residual Calo 10
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450


Linear Residual Calo 11
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450


Linear Residual Calo 12
4
3
2
1
0
−1
−2
−3
−4
0
50
100
150
200
250
300
350
400
450


Linear Residual Calo 13
4
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−1
−2
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−4
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400
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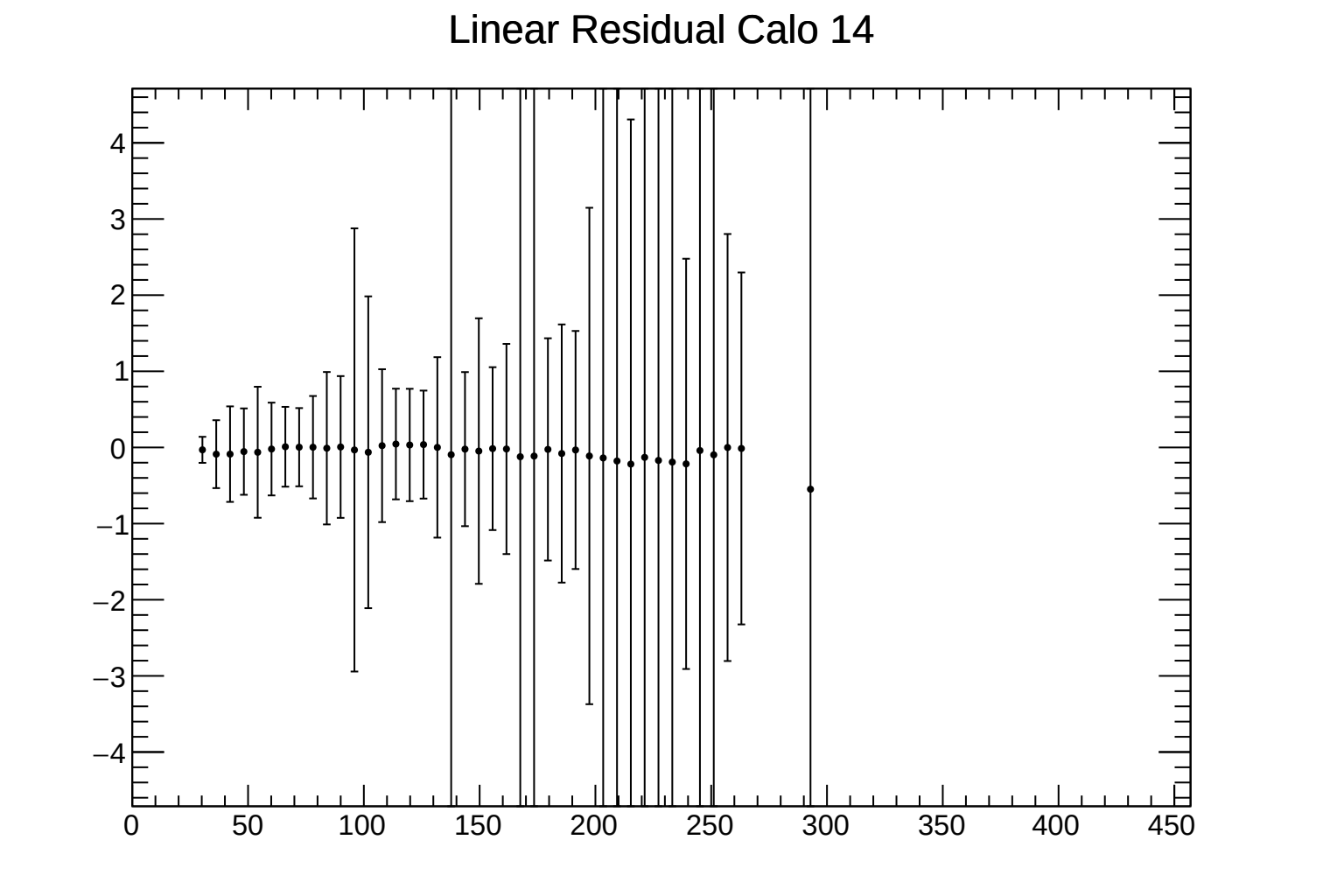
Linear Residual Calo 14
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−4
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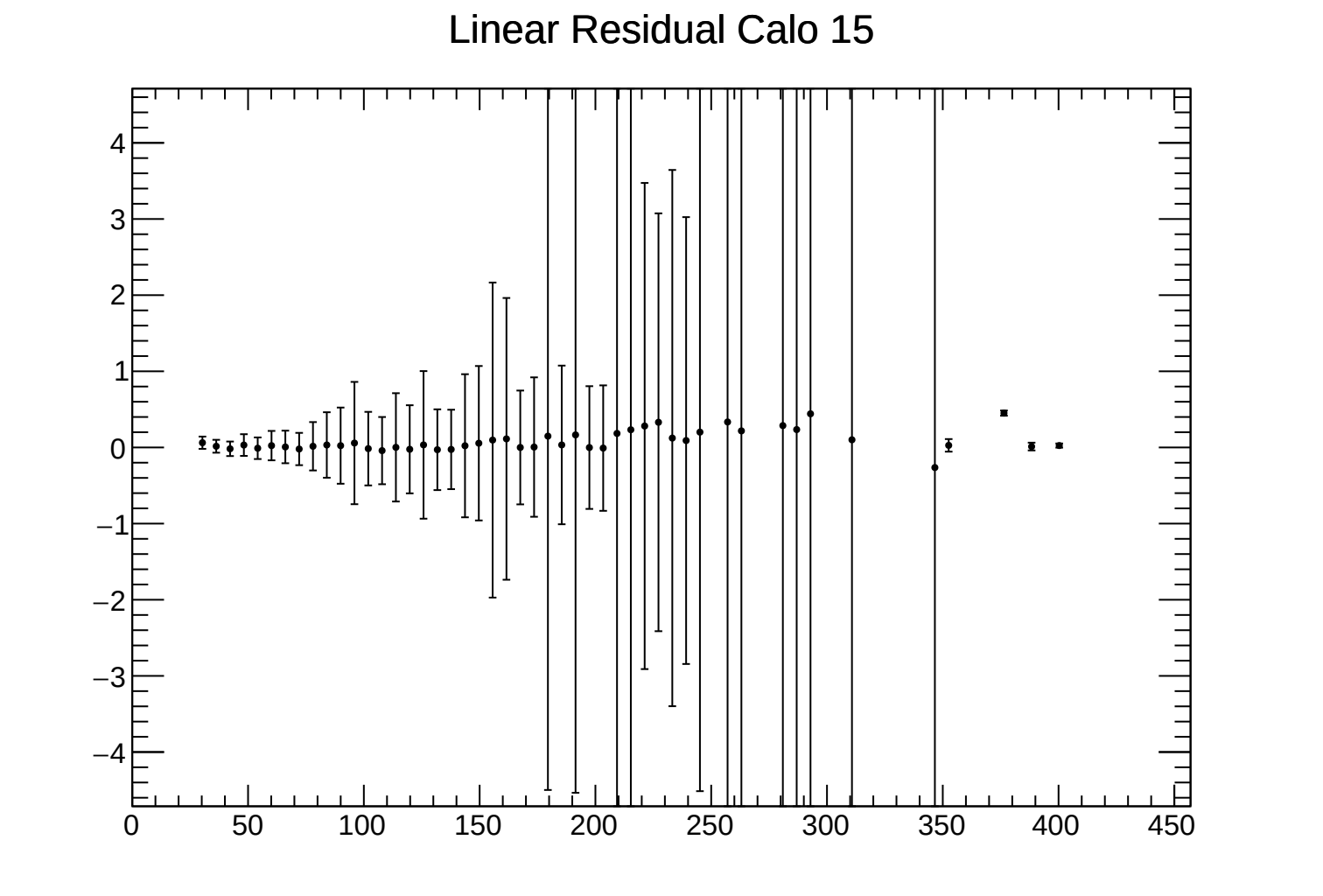
Linear Residual Calo 15
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400
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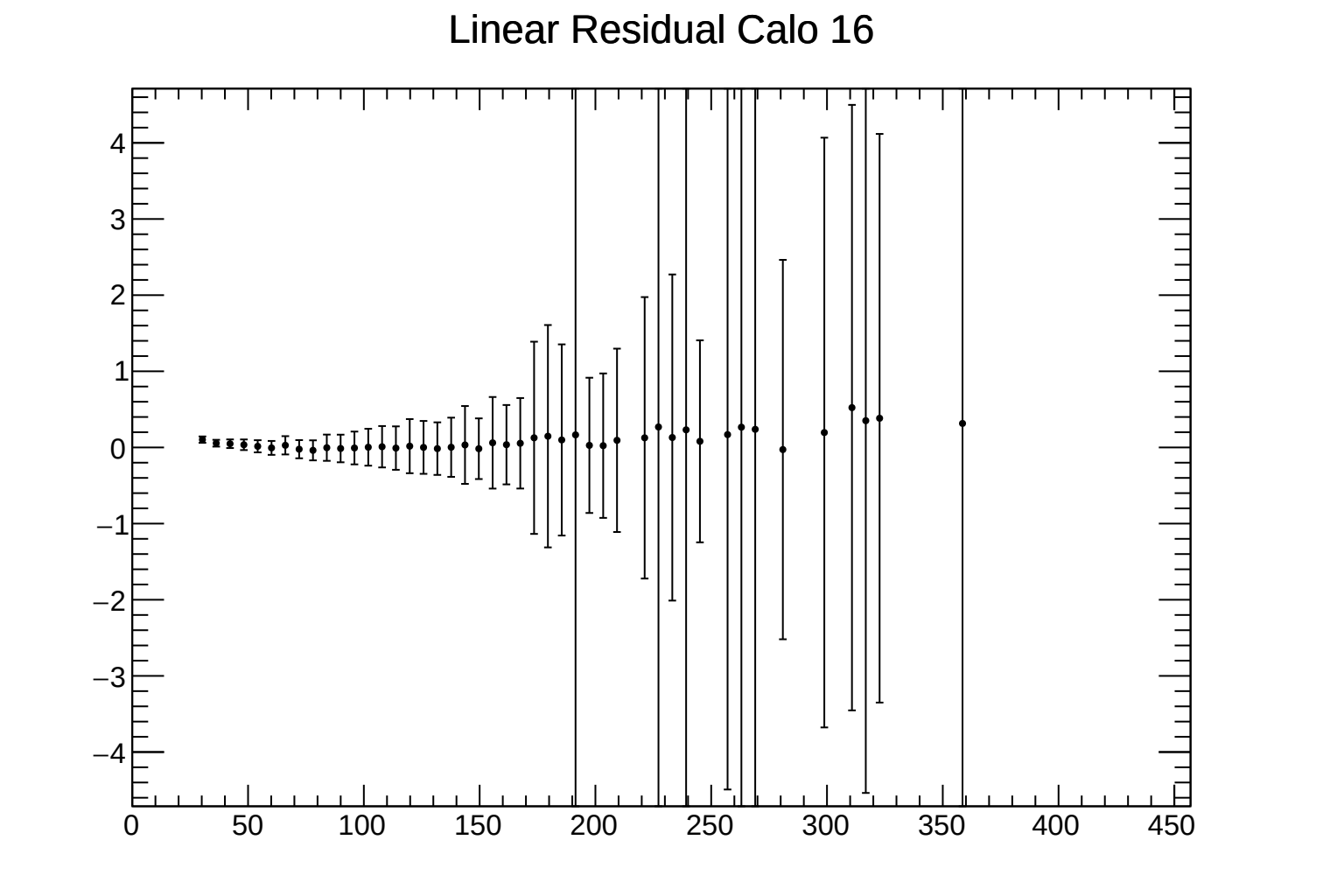
Linear Residual Calo 16
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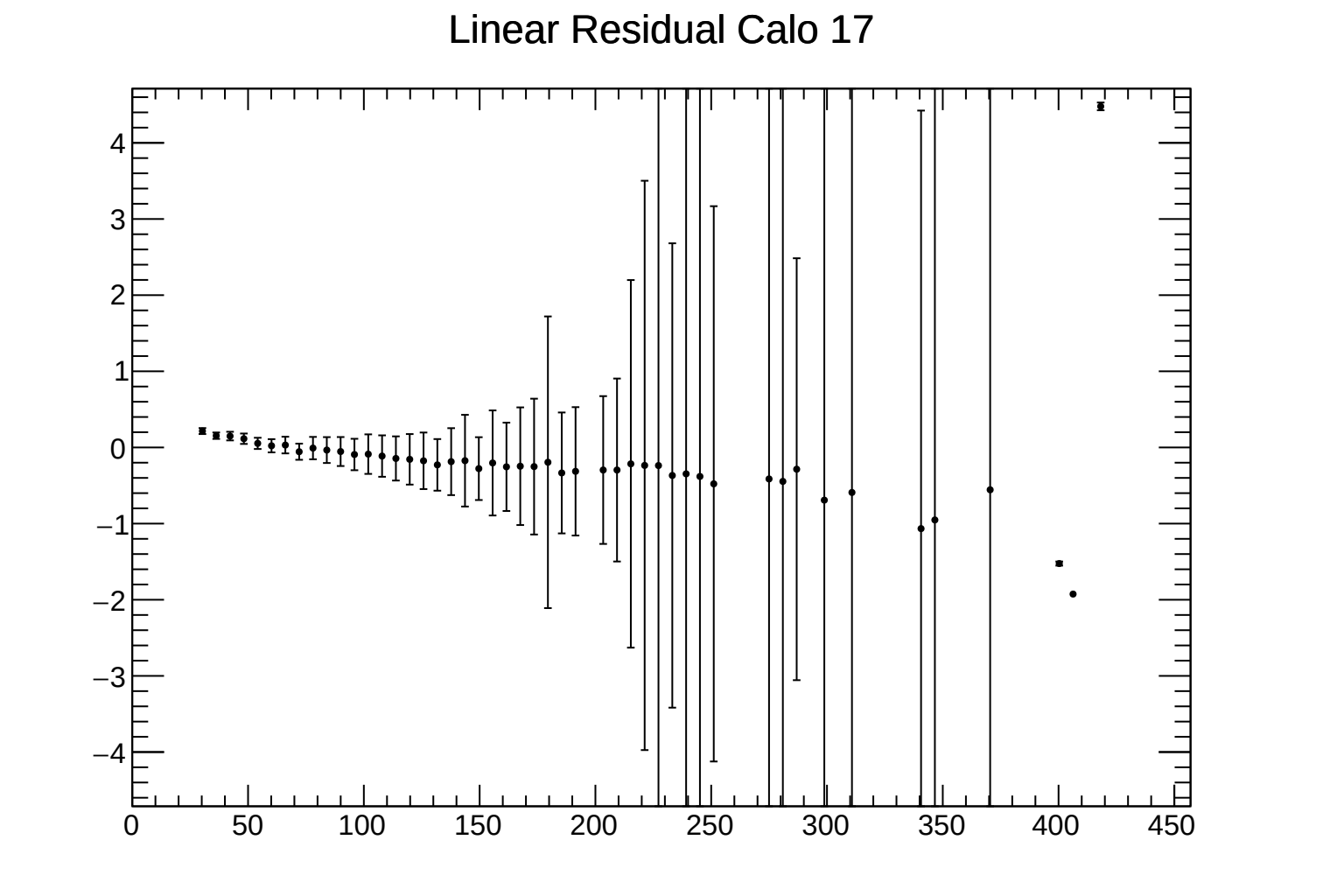
Linear Residual Calo 17
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0
−1
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−3
−4
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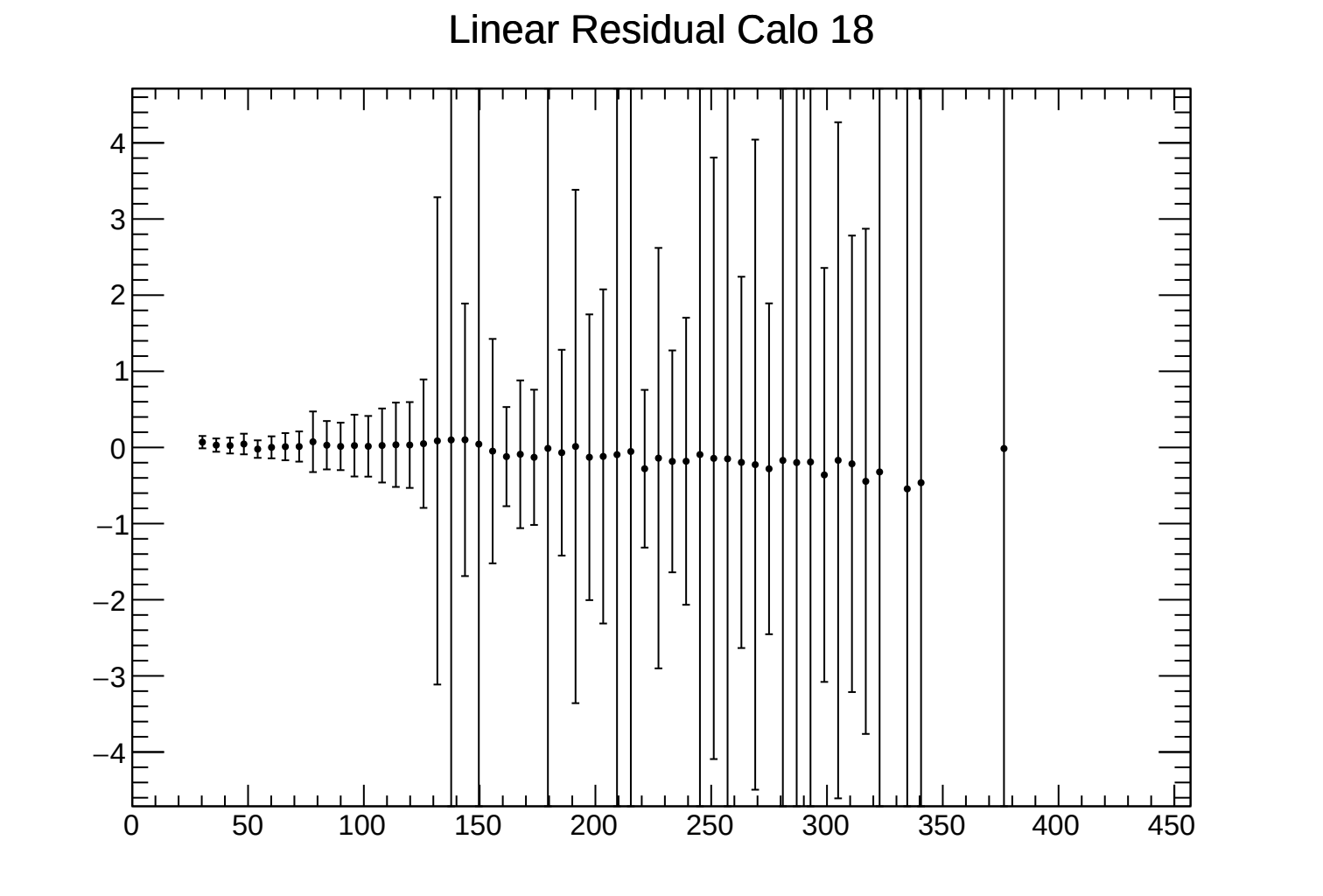
400
450


Linear Residual Calo 18
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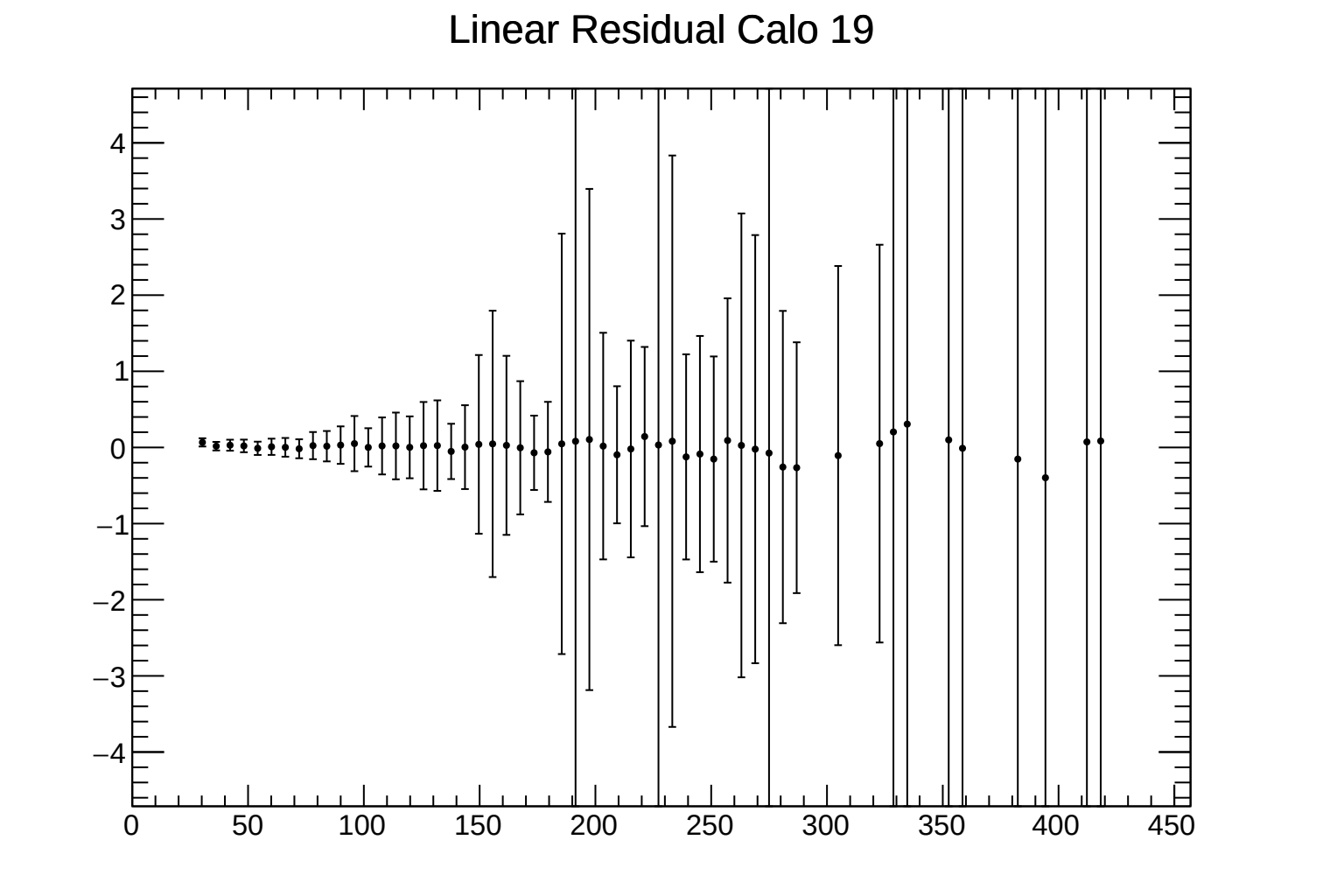
Linear Residual Calo 19
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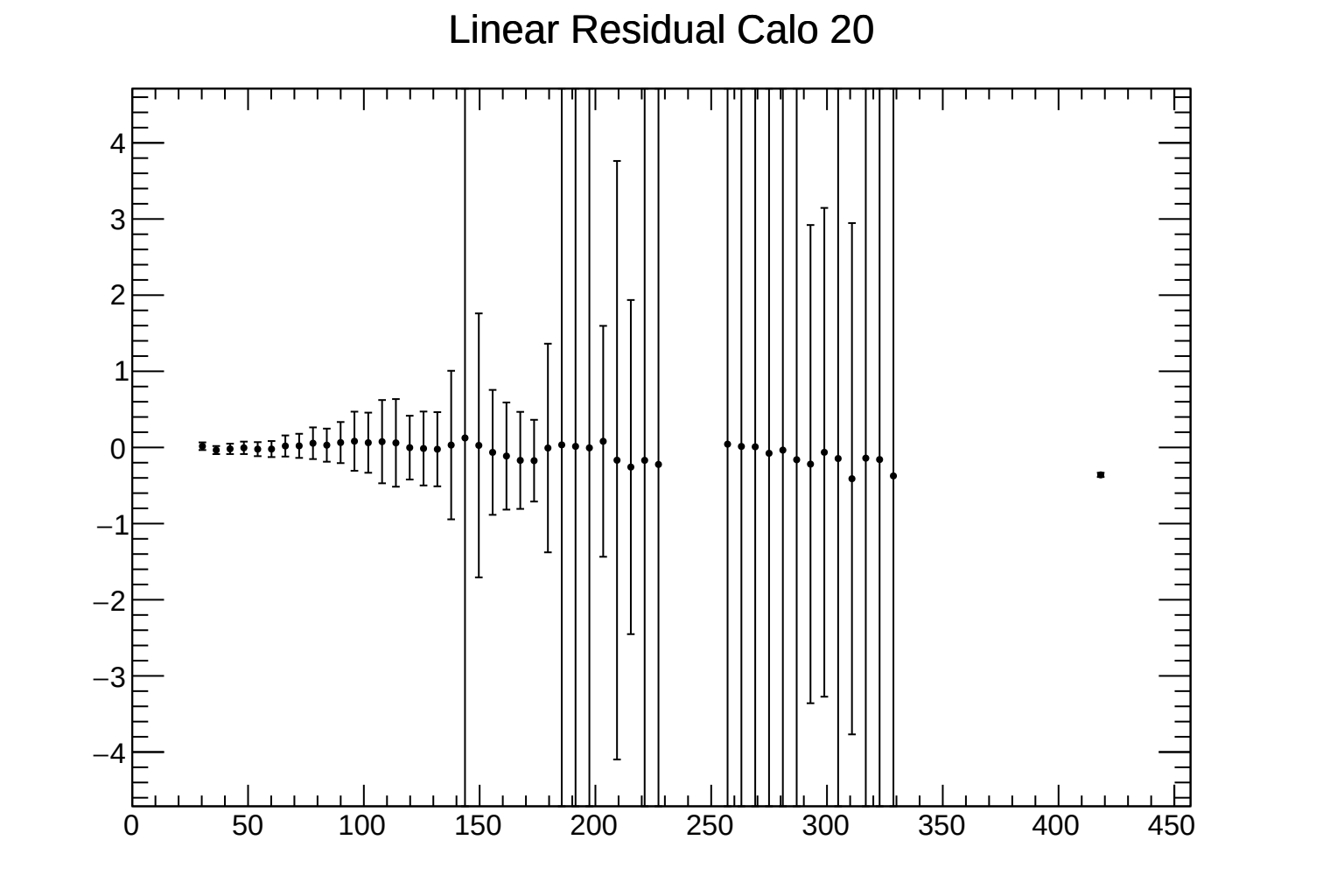
Linear Residual Calo 20
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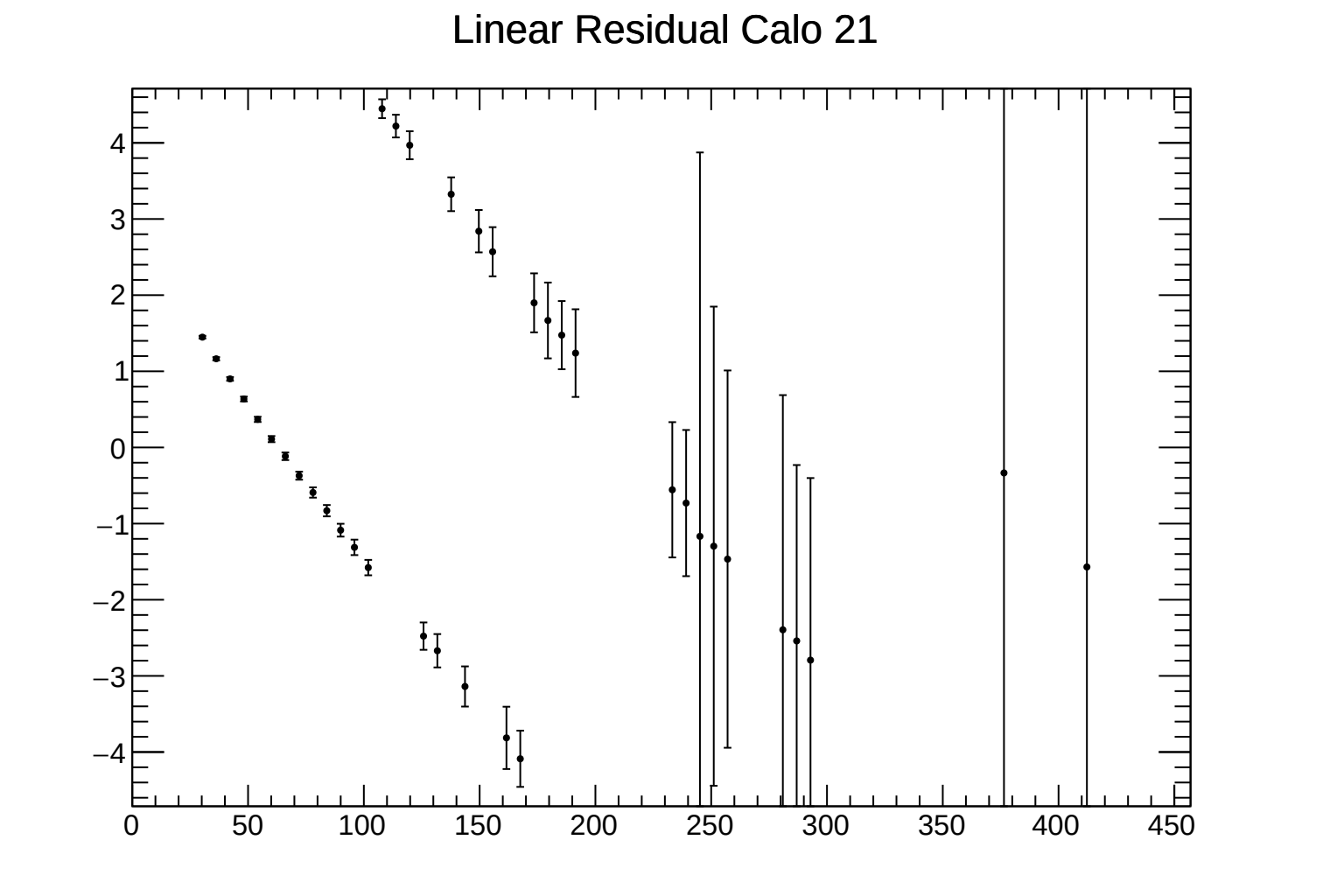
Linear Residual Calo 21
4
3
2
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−4
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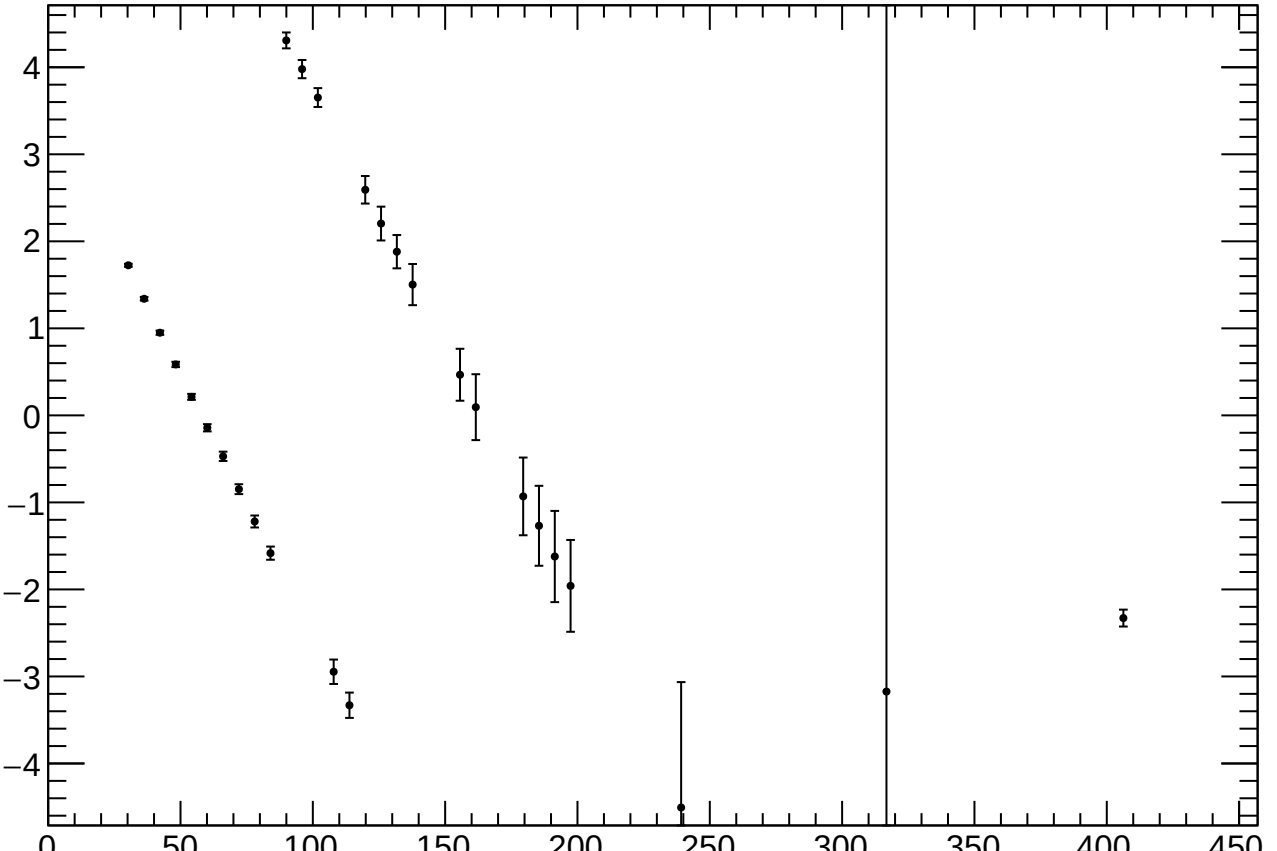
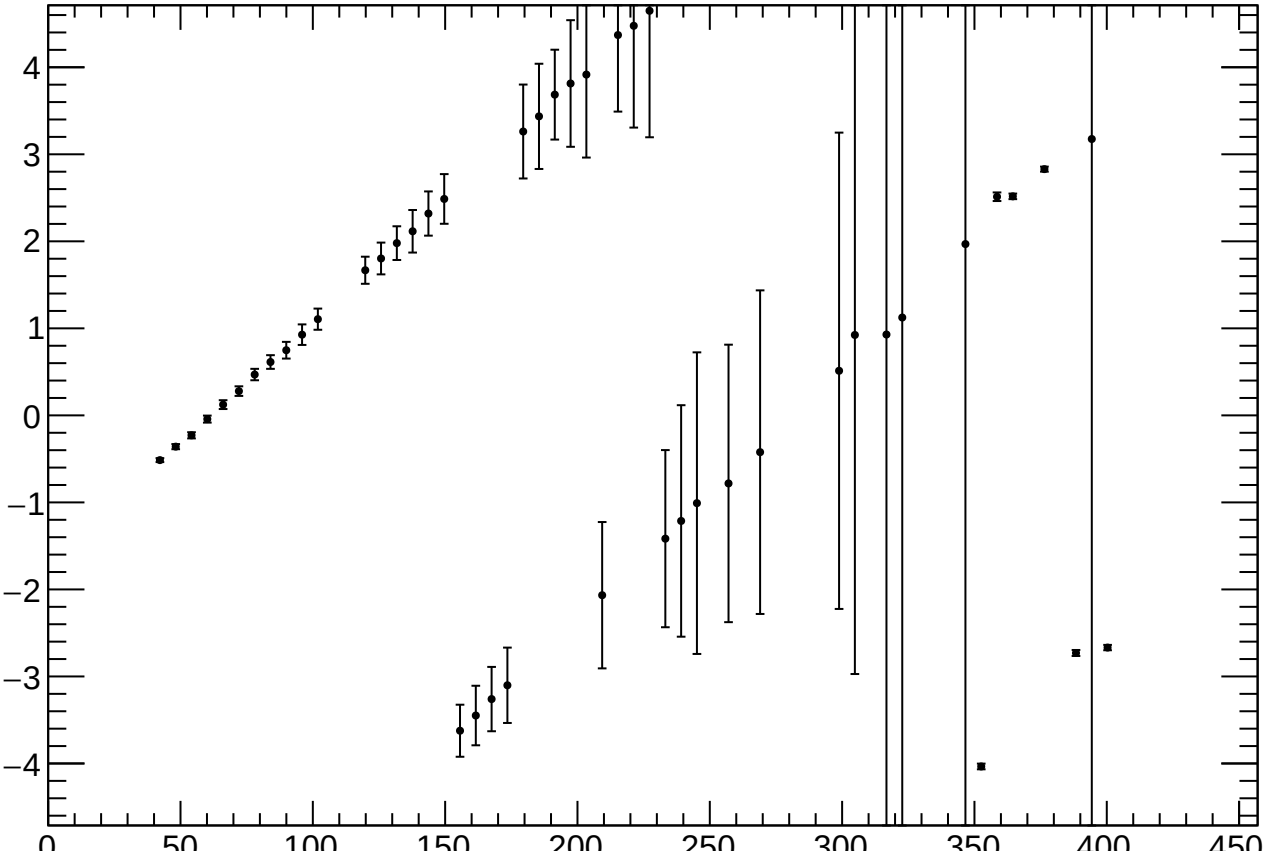
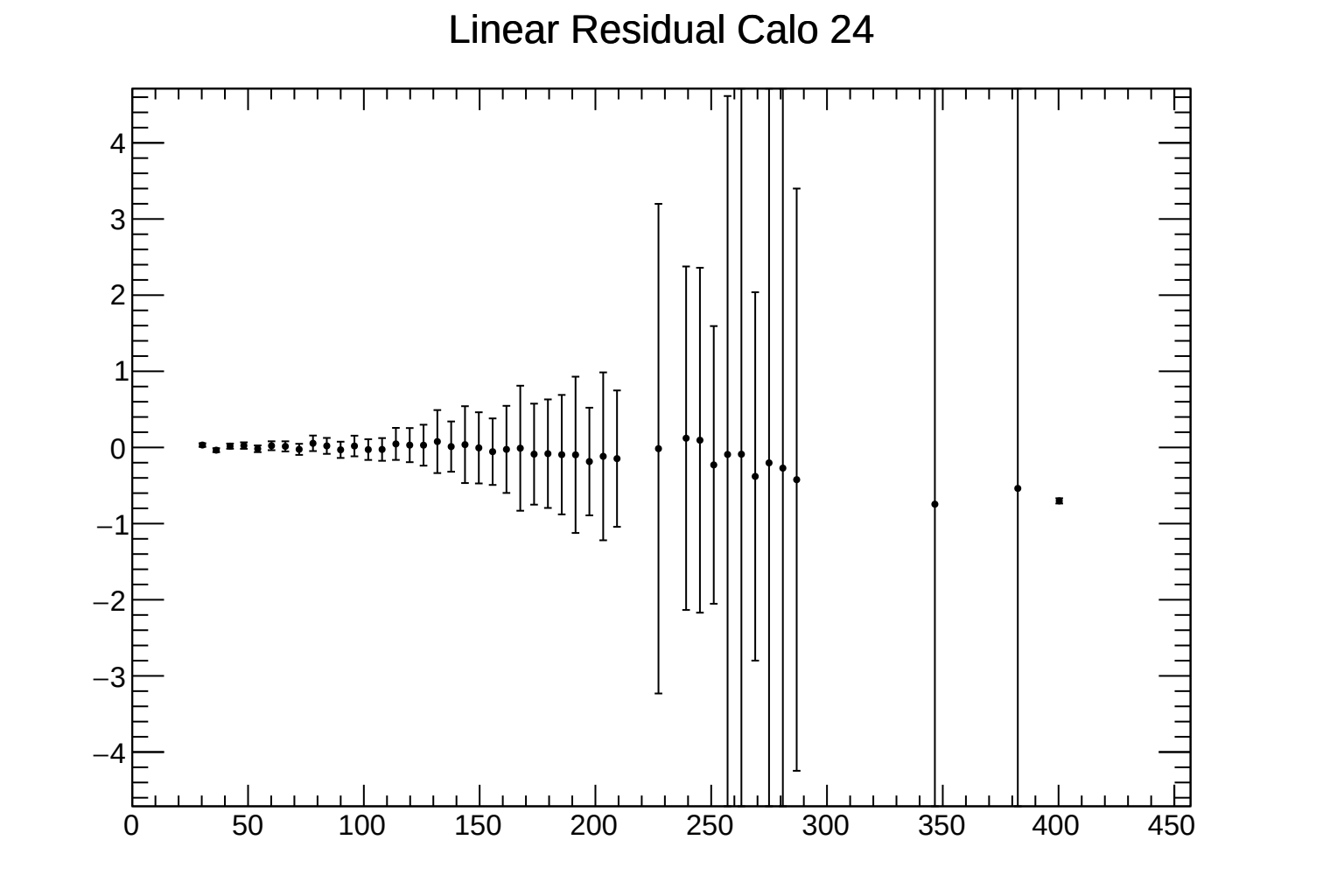
300
350
400
450

Linear Residual Calo 22



Linear Residual Calo 23




Linear Residual Calo 24
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−2
−3
−4
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100
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200
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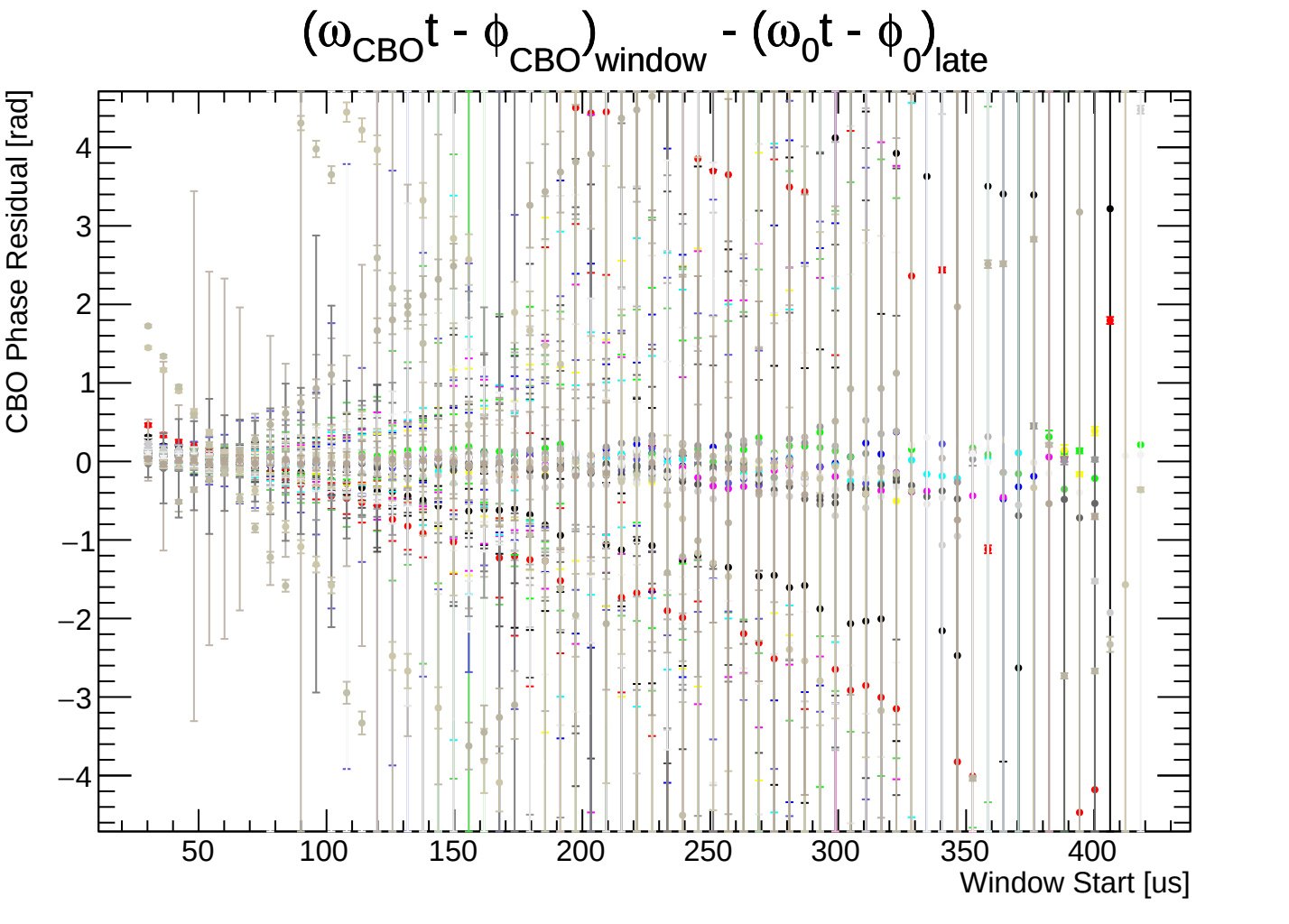
300
350
400
450


$(\omega_{CBO}t - \phi_{CBO})_{window} - (\omega_0 t - \phi_0)_{late}$
CBO Phase Residual [rad]
4
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−1
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400
Window Start [us]