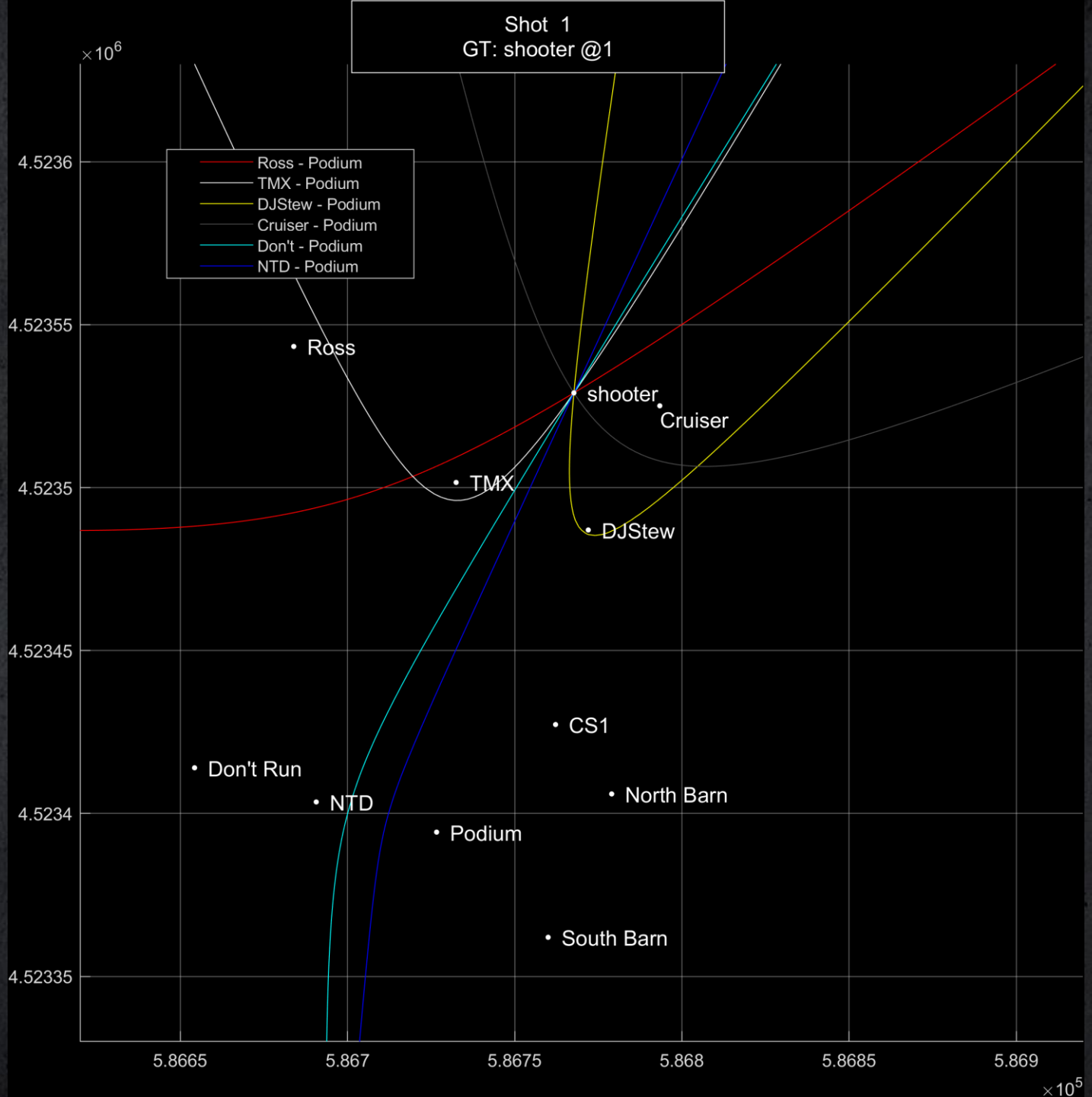
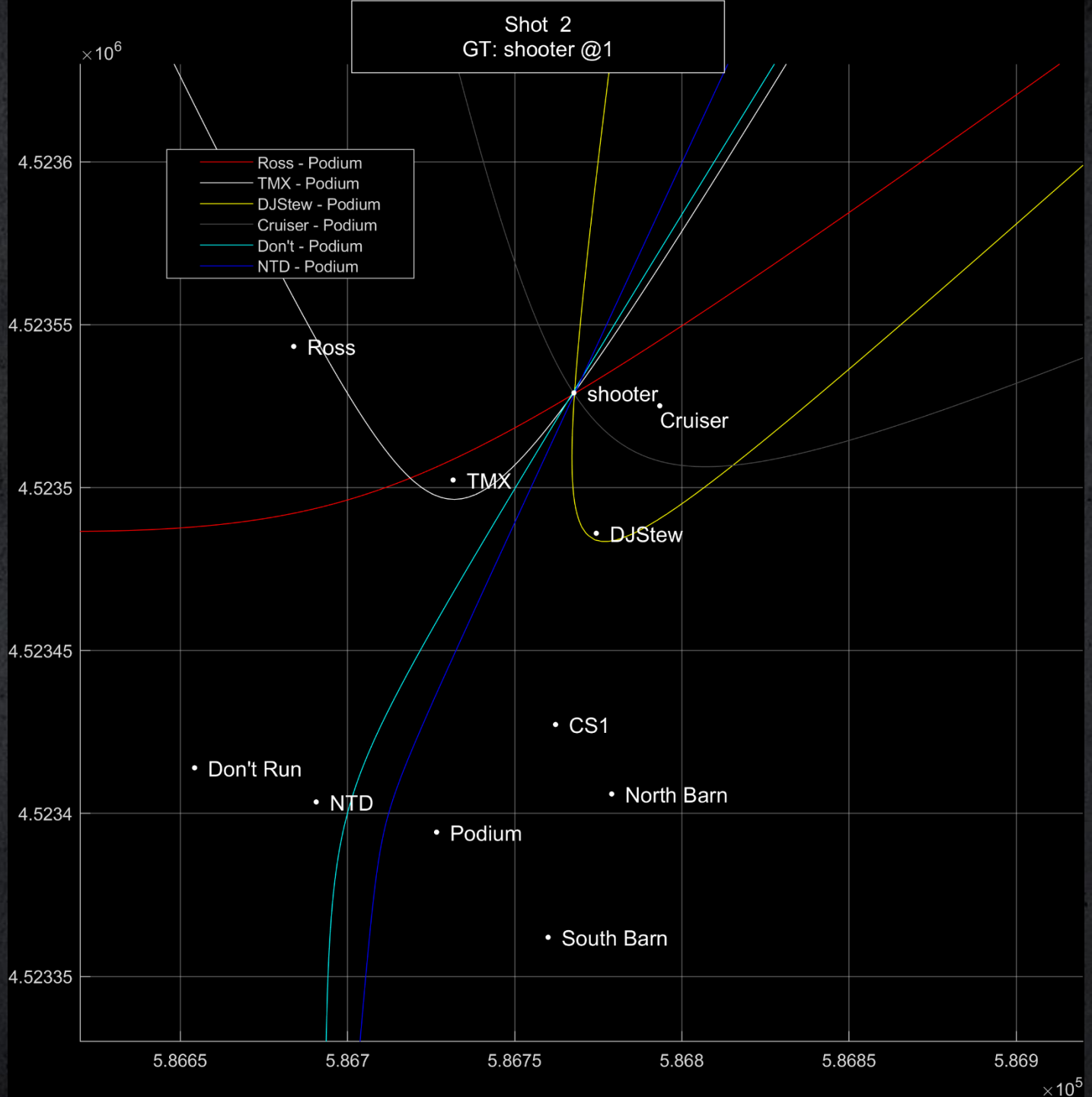
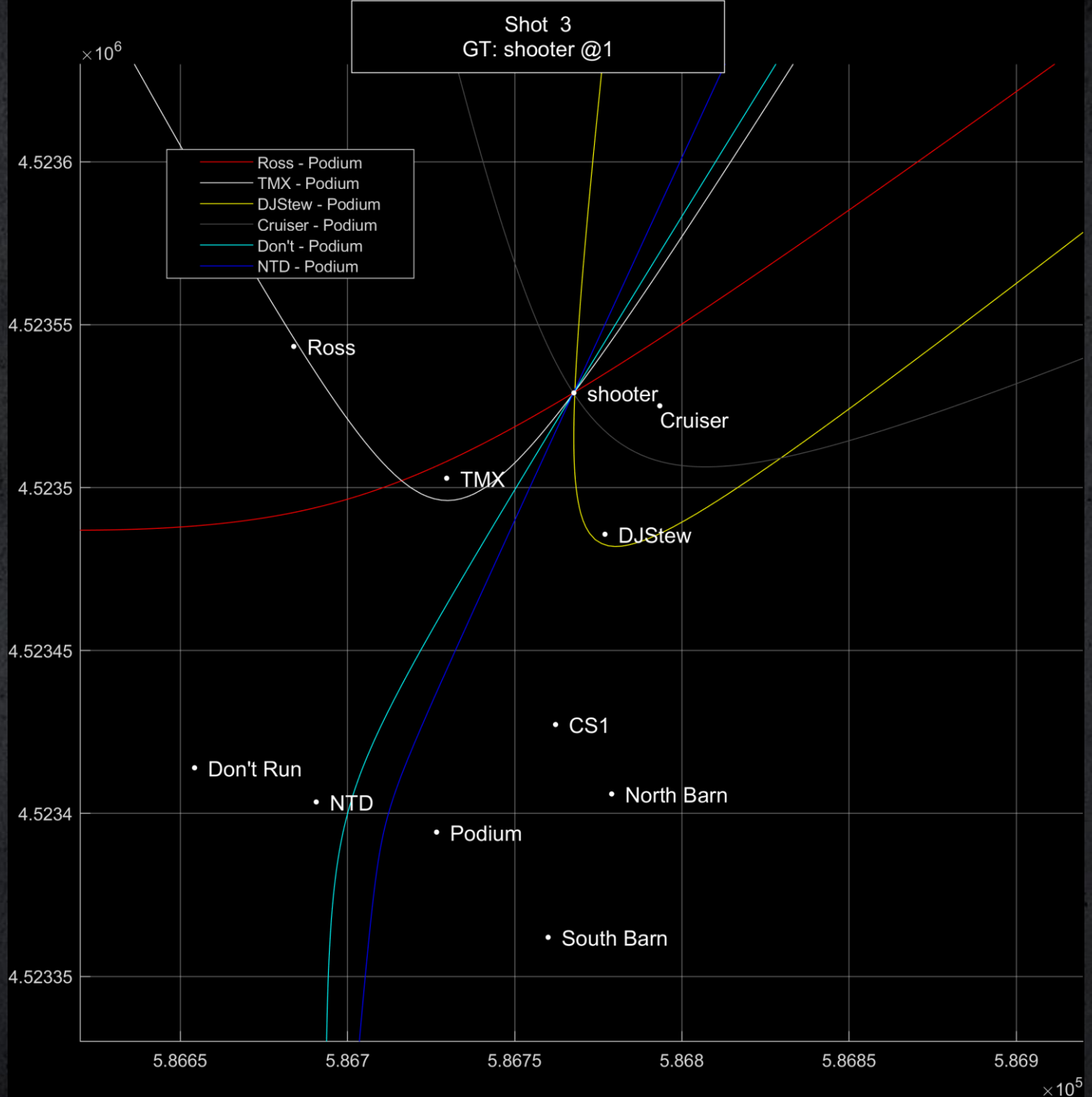
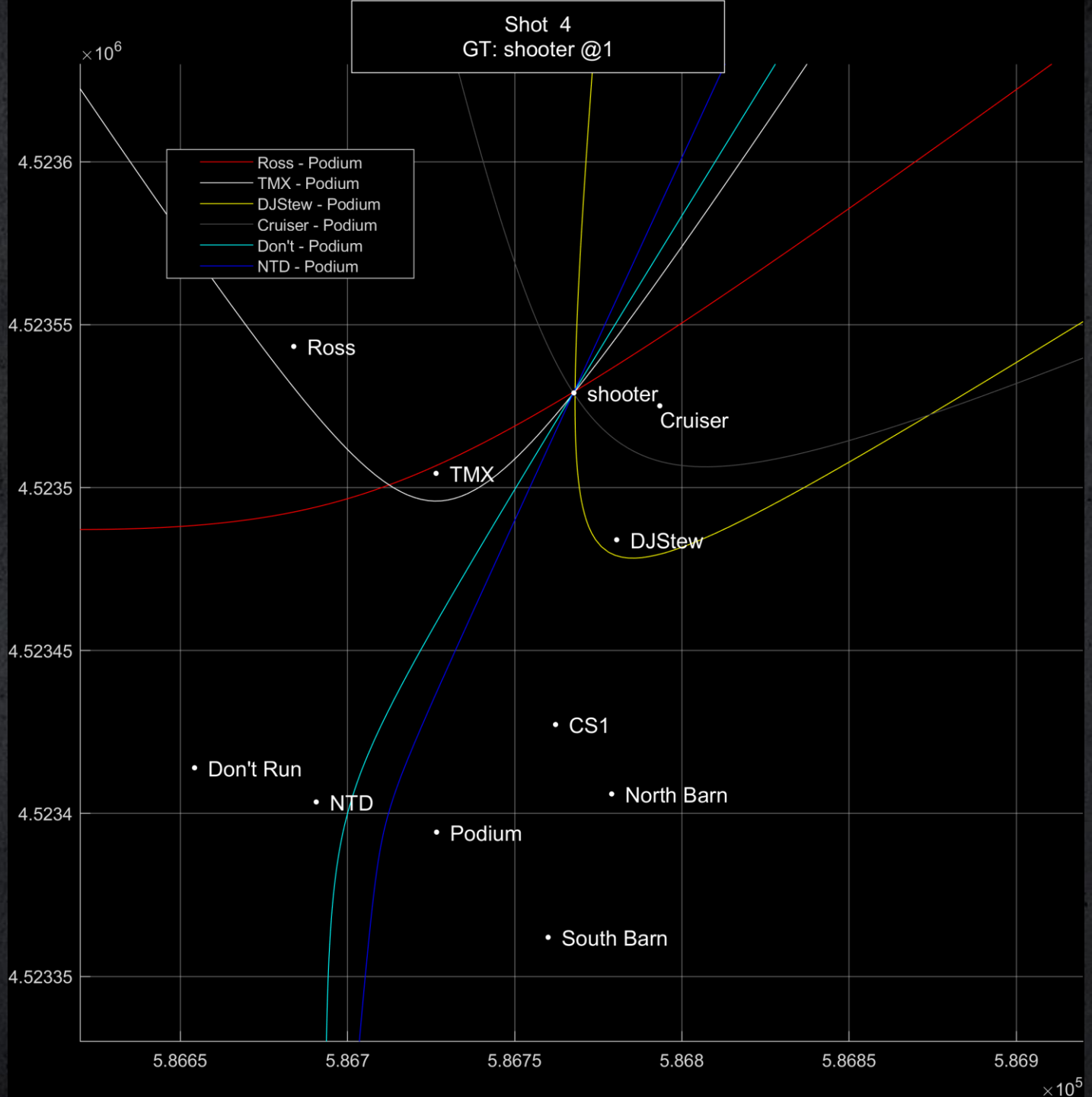
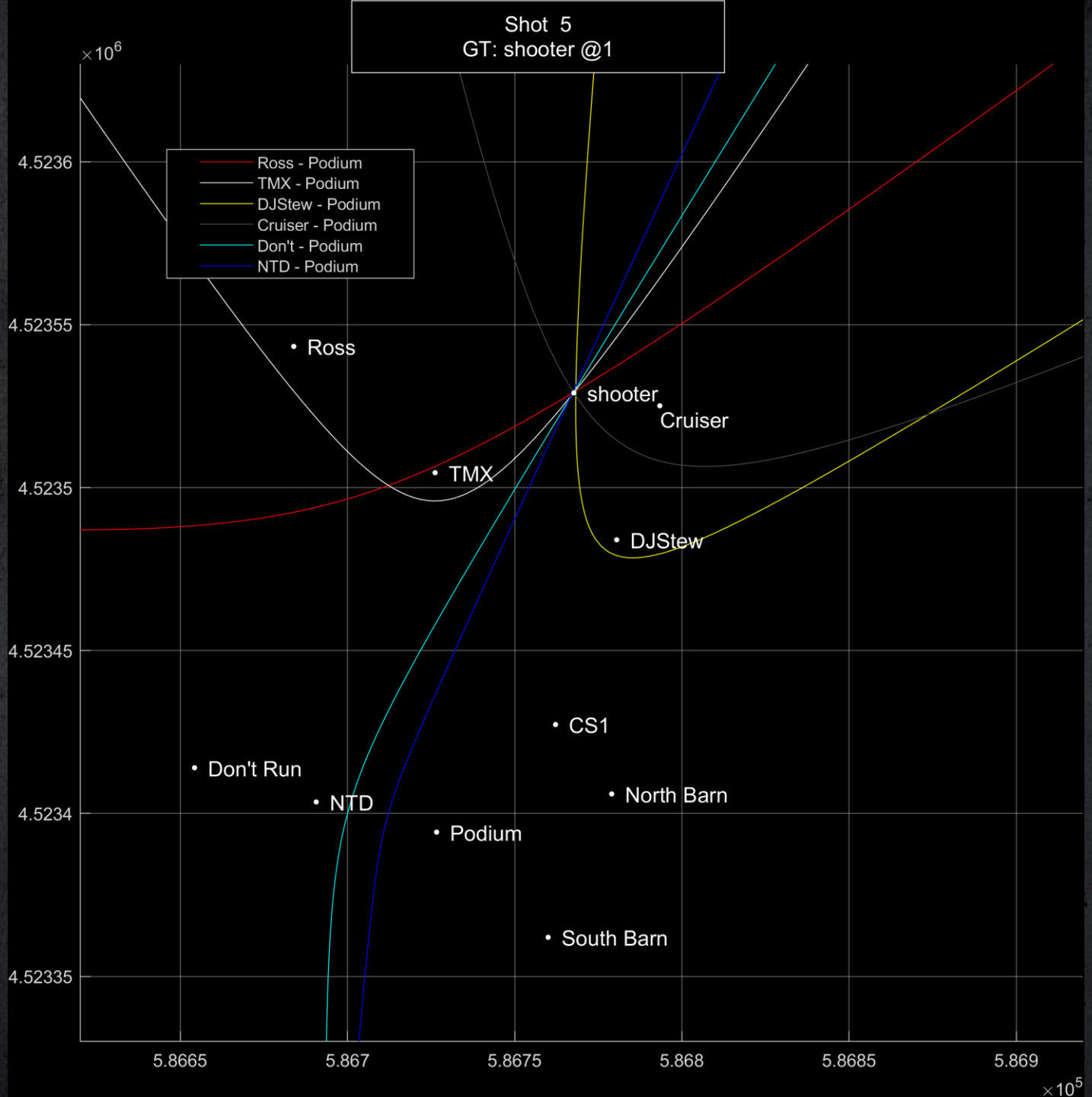
TDOA Hyperbolas for Shots 1 -10
Shown at a Common Zoom Level

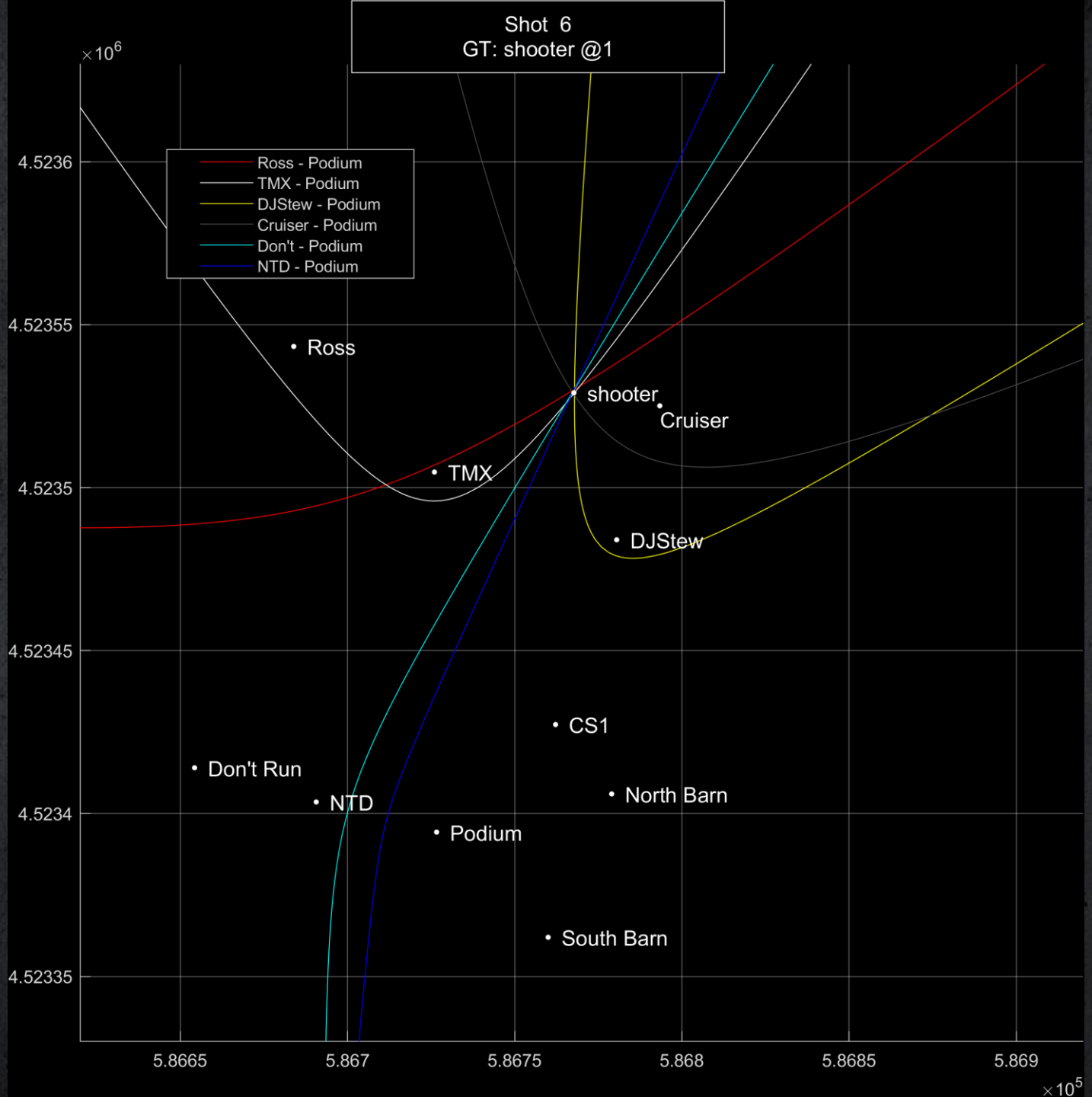

Shot 1
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

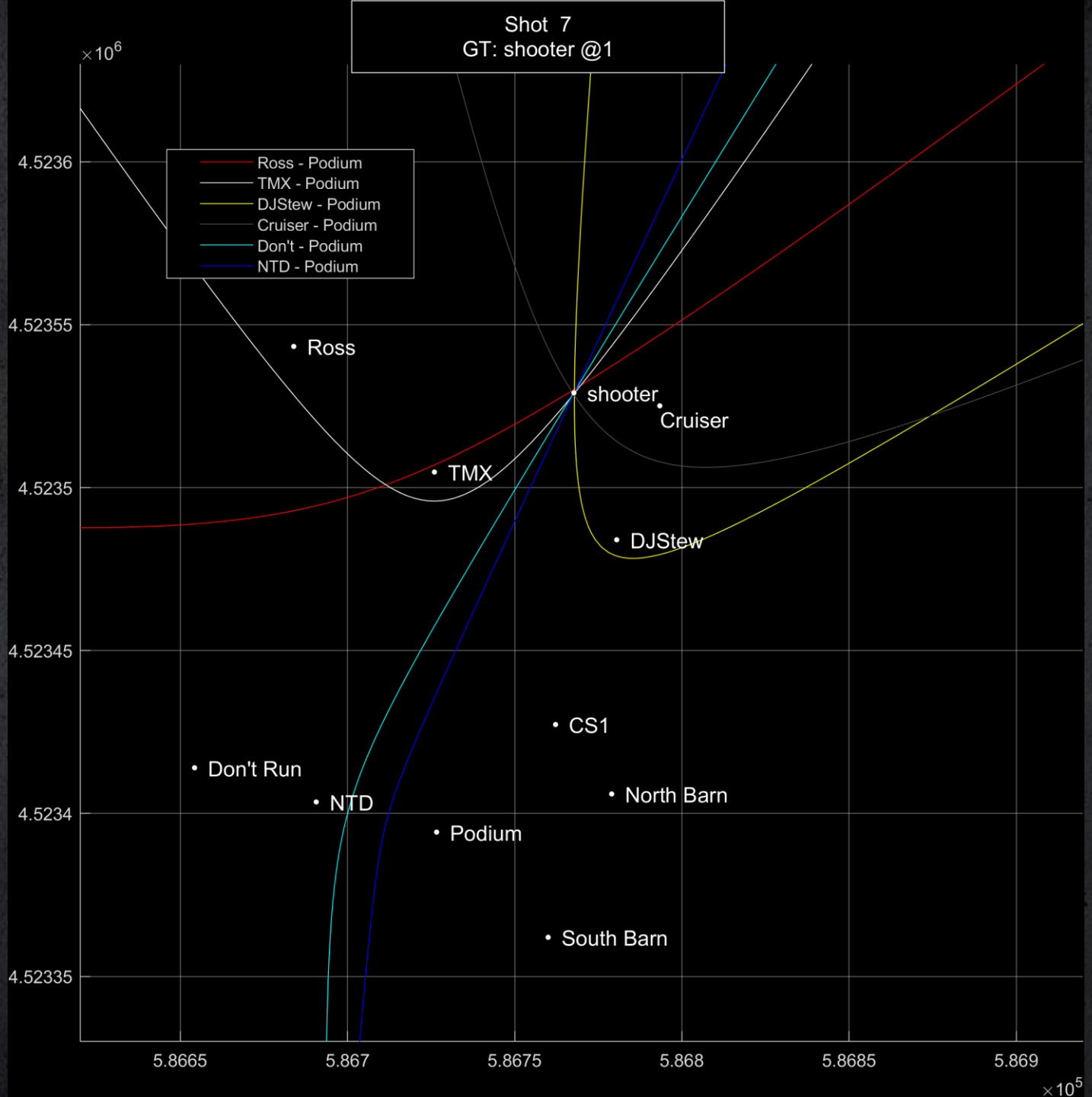

Shot 2
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

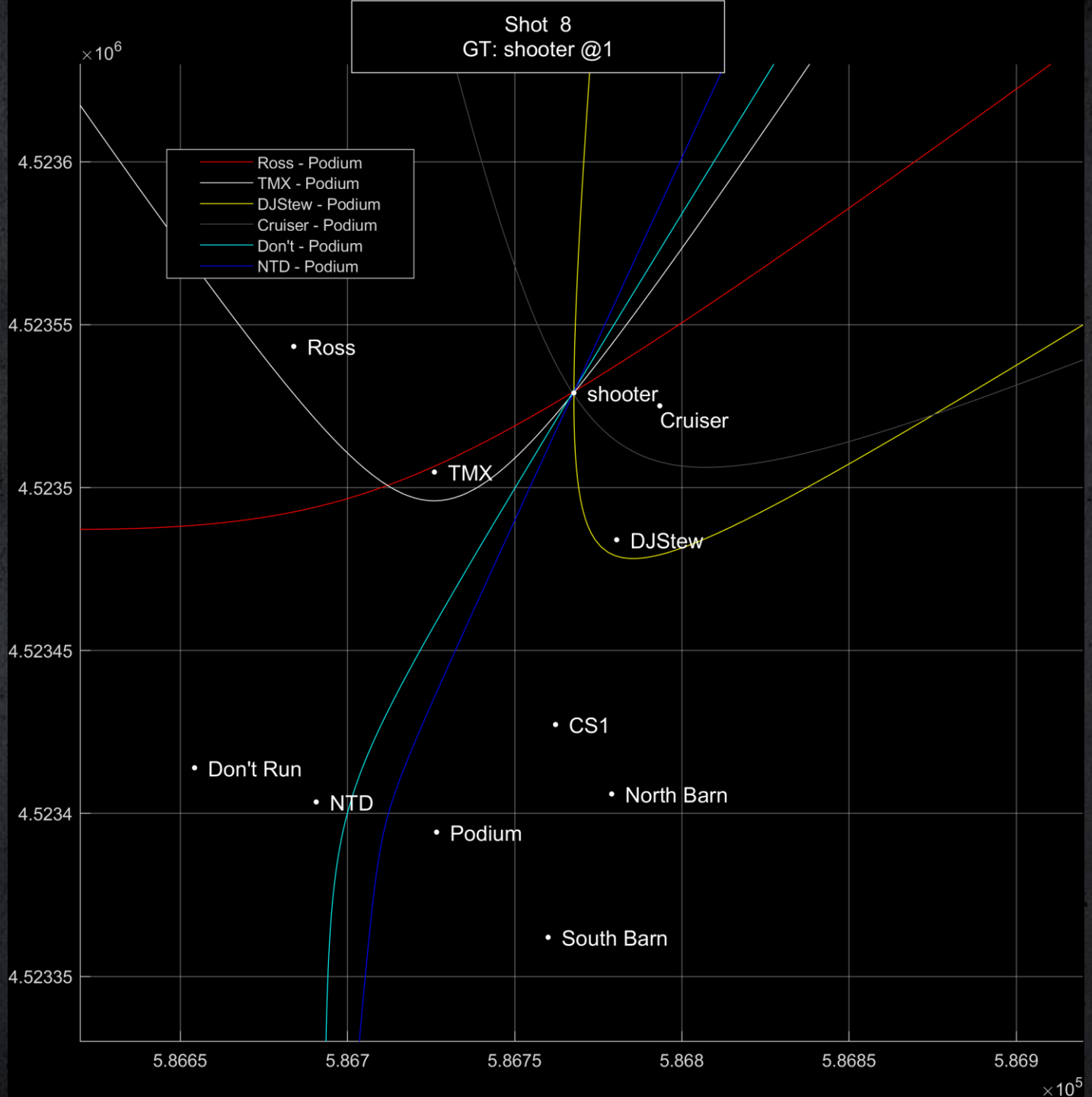

Shot 3
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

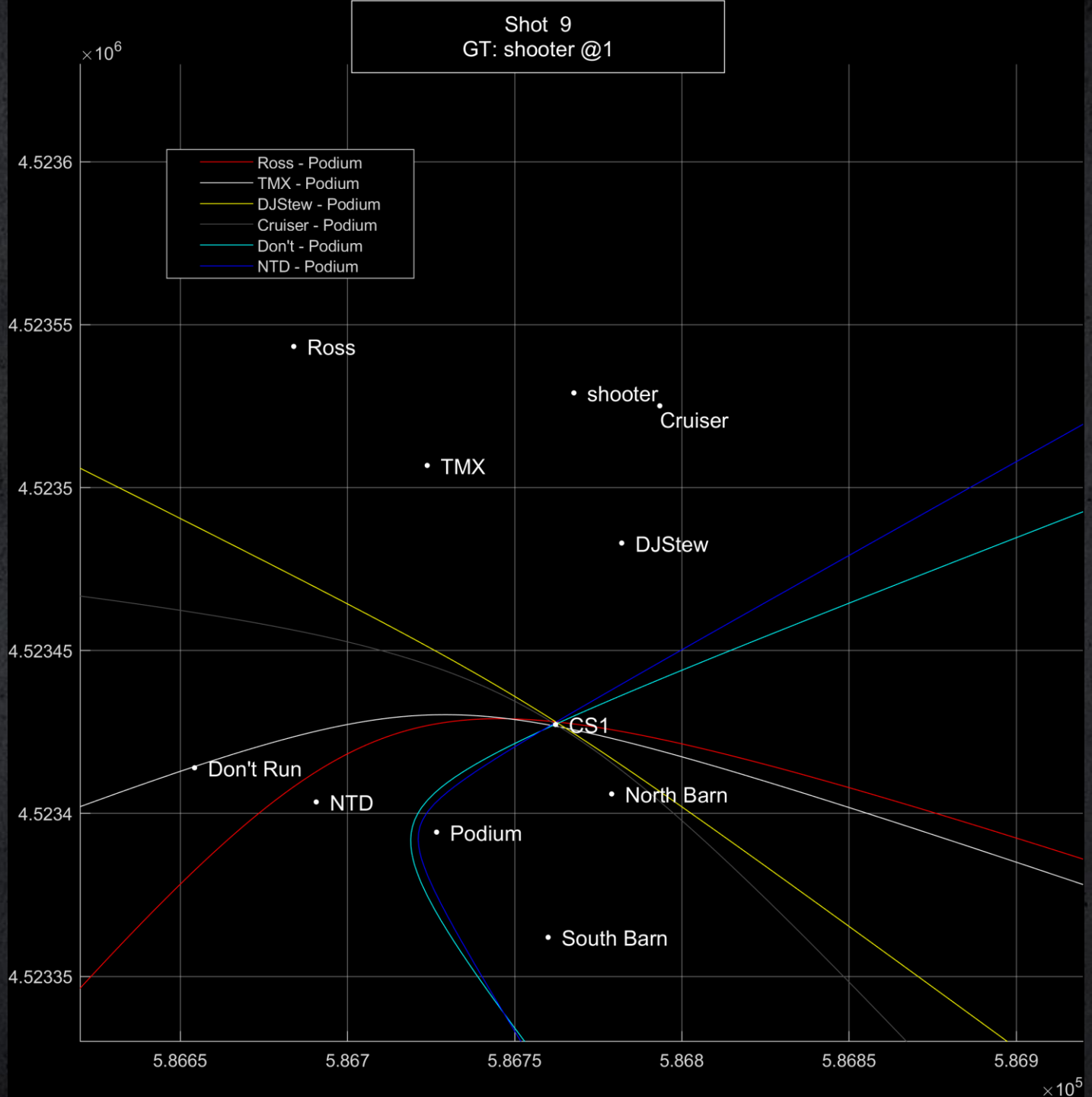

Shot 4
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

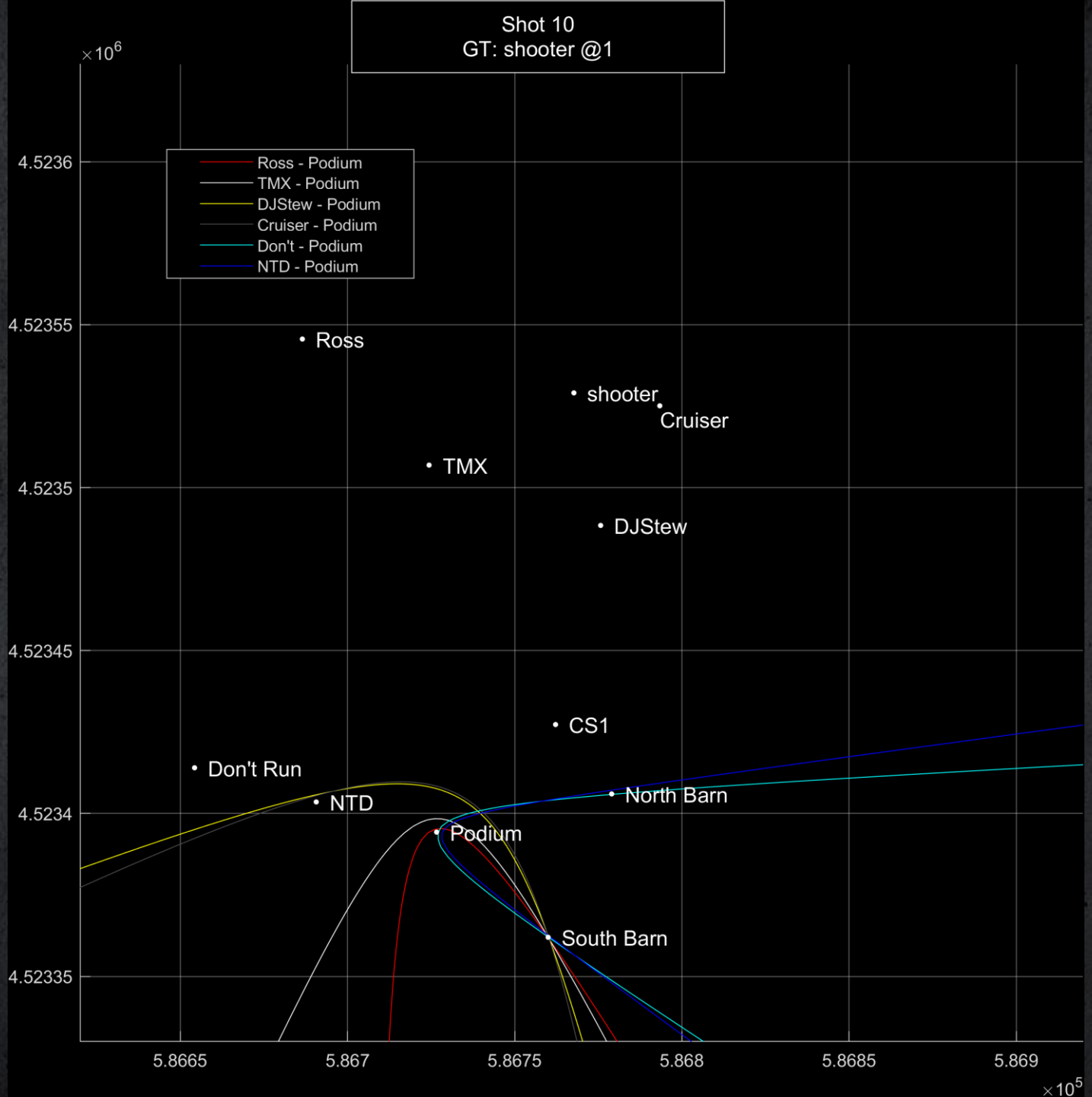

Shot 5
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5


Shot 6
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

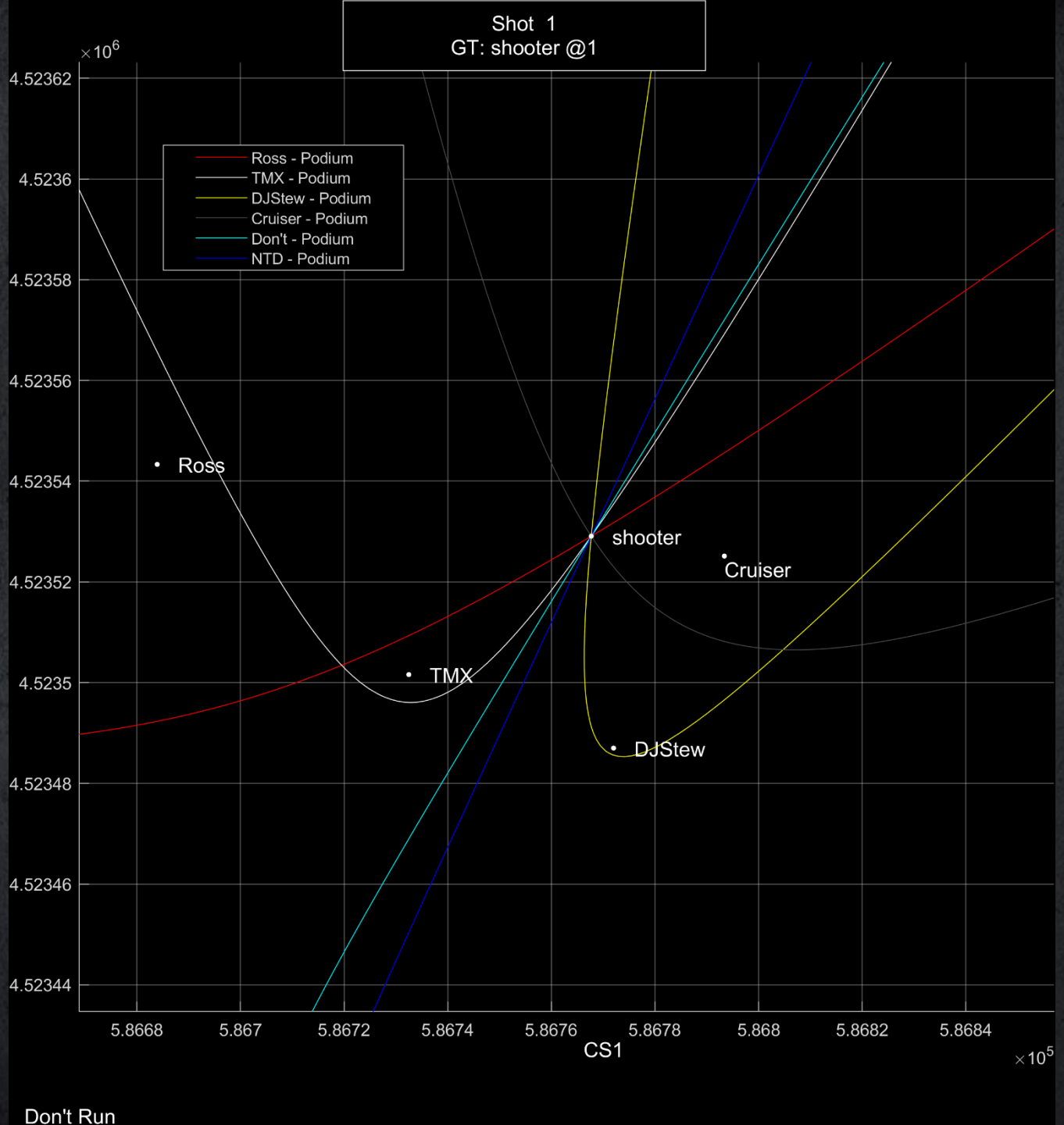

Shot 7
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5


Shot 8
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

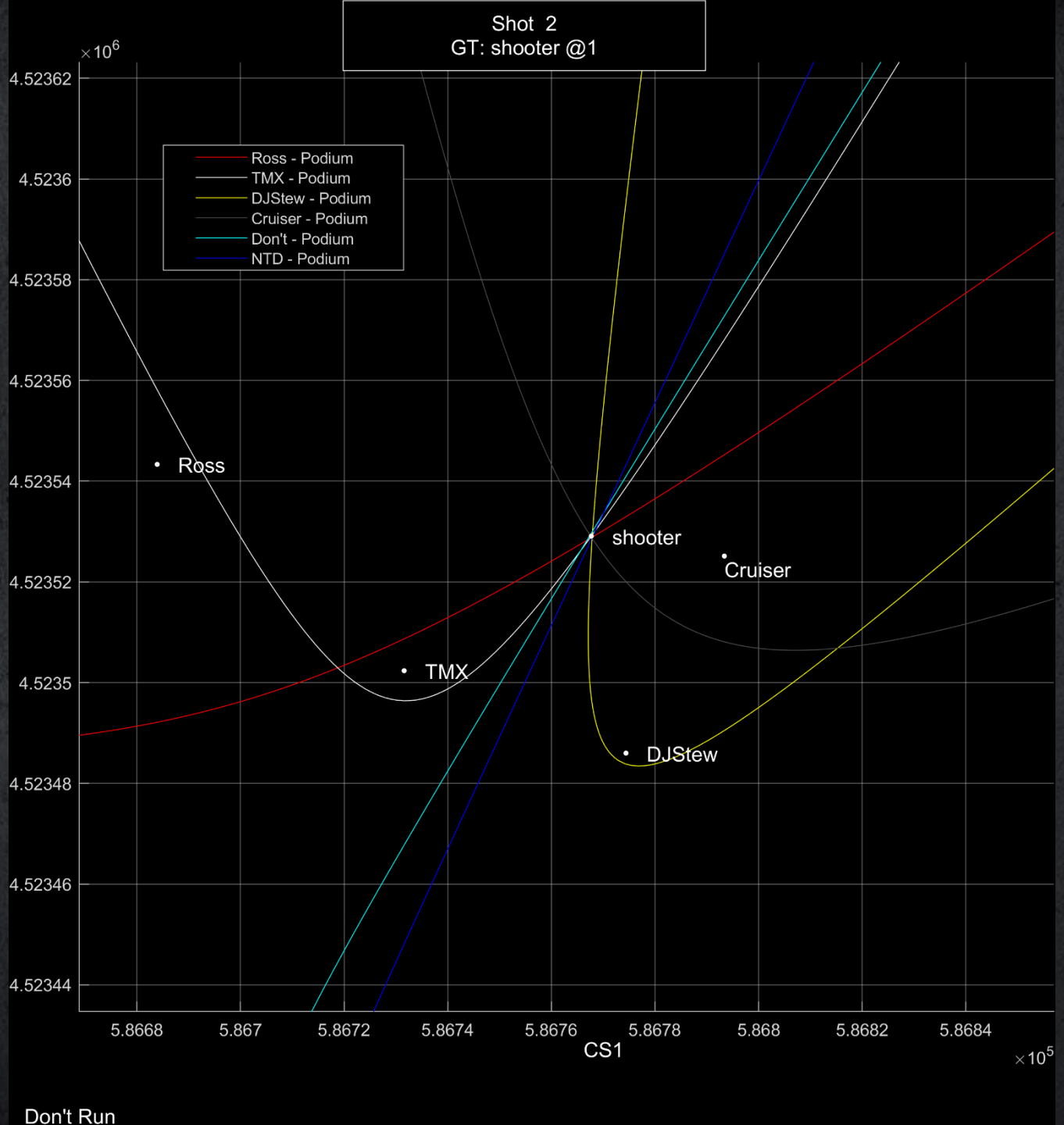

Shot 9
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5


Shot 10
GT: shooter @1
×10^6
4.5236
4.52355
4.5235
4.52345
4.5234
4.52335
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
CS1
Don't Run
NTD
North Barn
Podium
South Barn
5.8665
5.867
5.8675
5.868
5.8685
5.869
×10^5

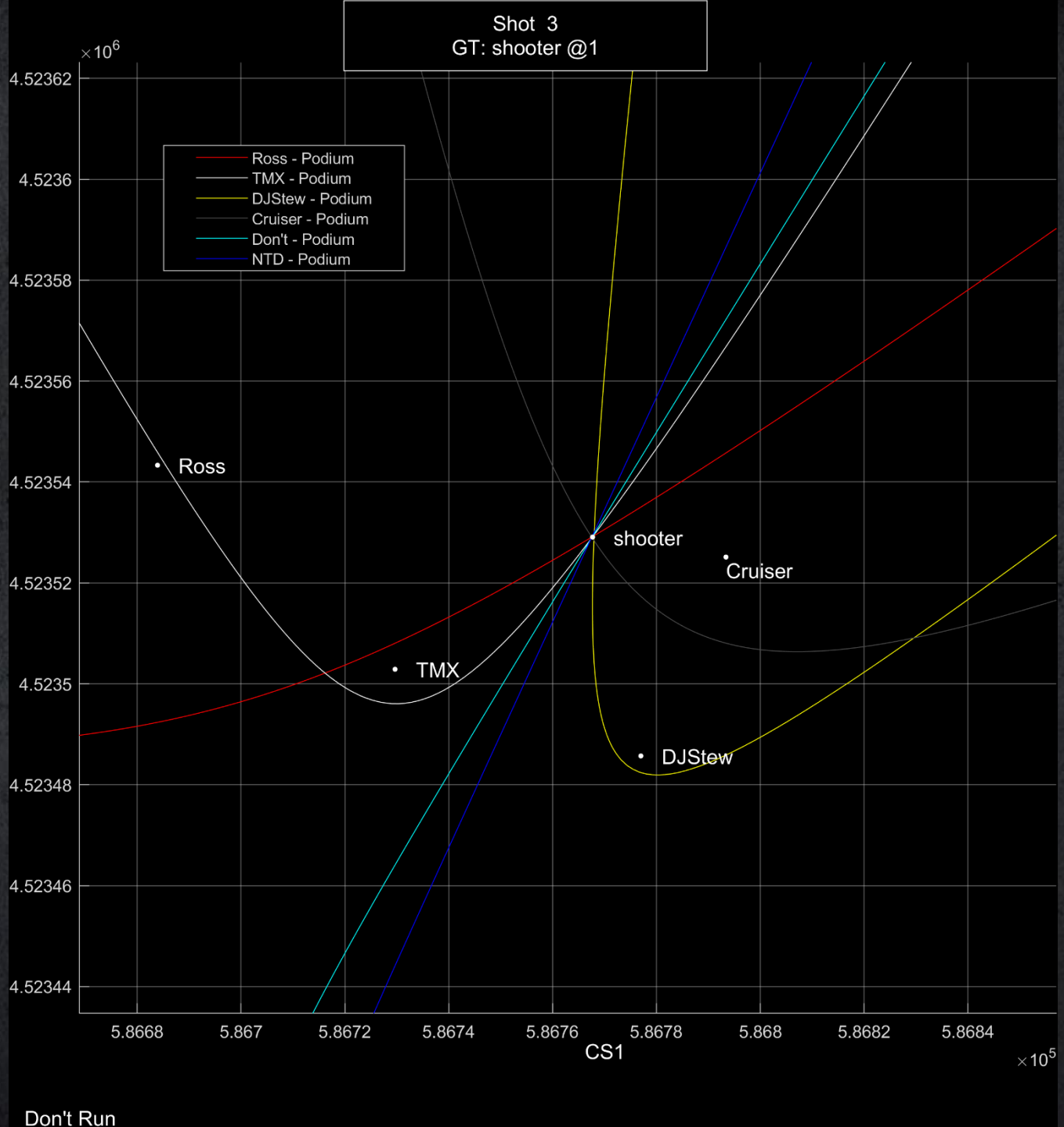
TDOA Hyperbolas for Shots 1 -10
Zoomed in to Show Detail


Shot 1
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
TMX
shooter
Cruiser
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

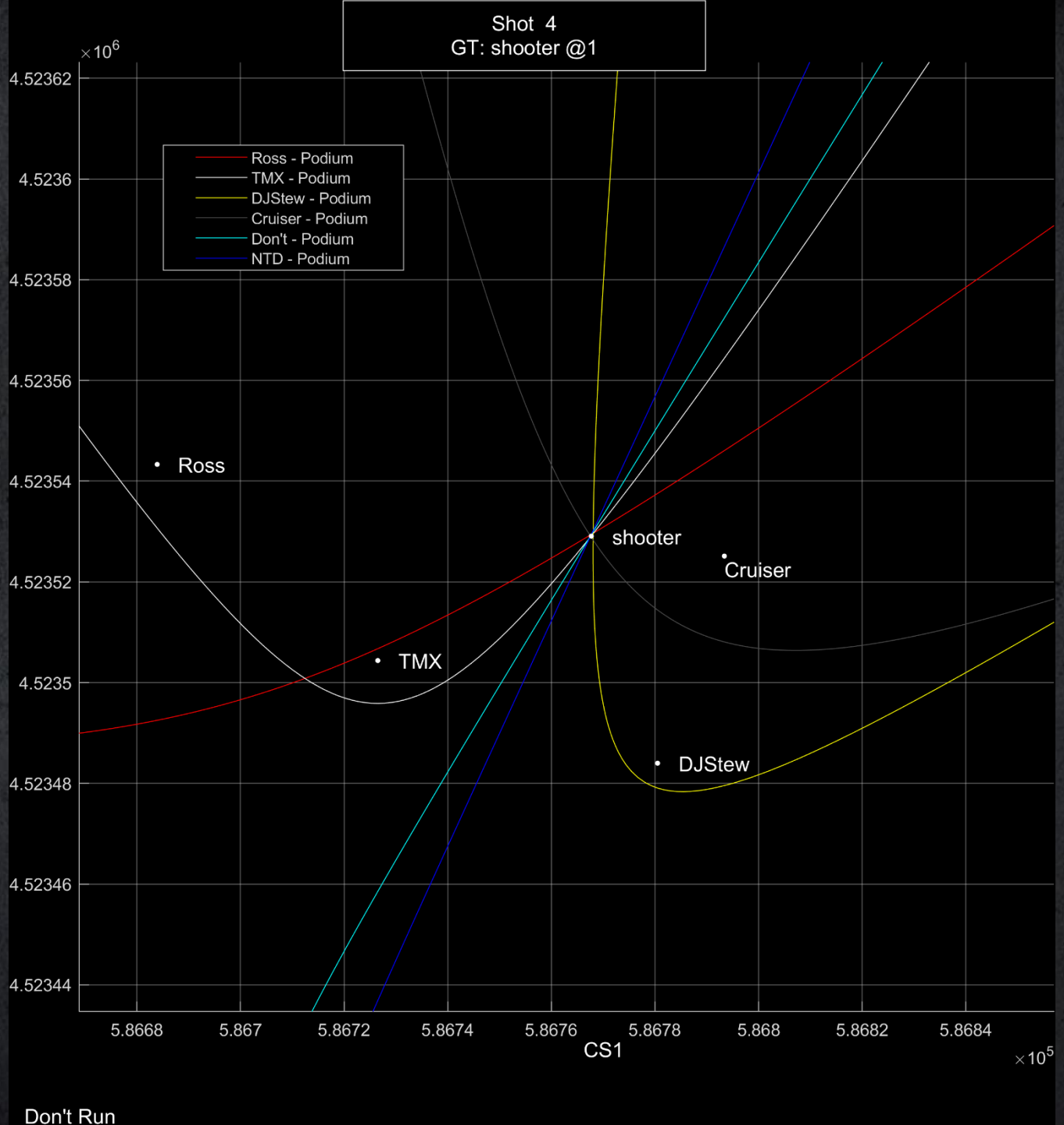
Don't Run


Shot 2
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
TMX
shooter
Cruiser
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

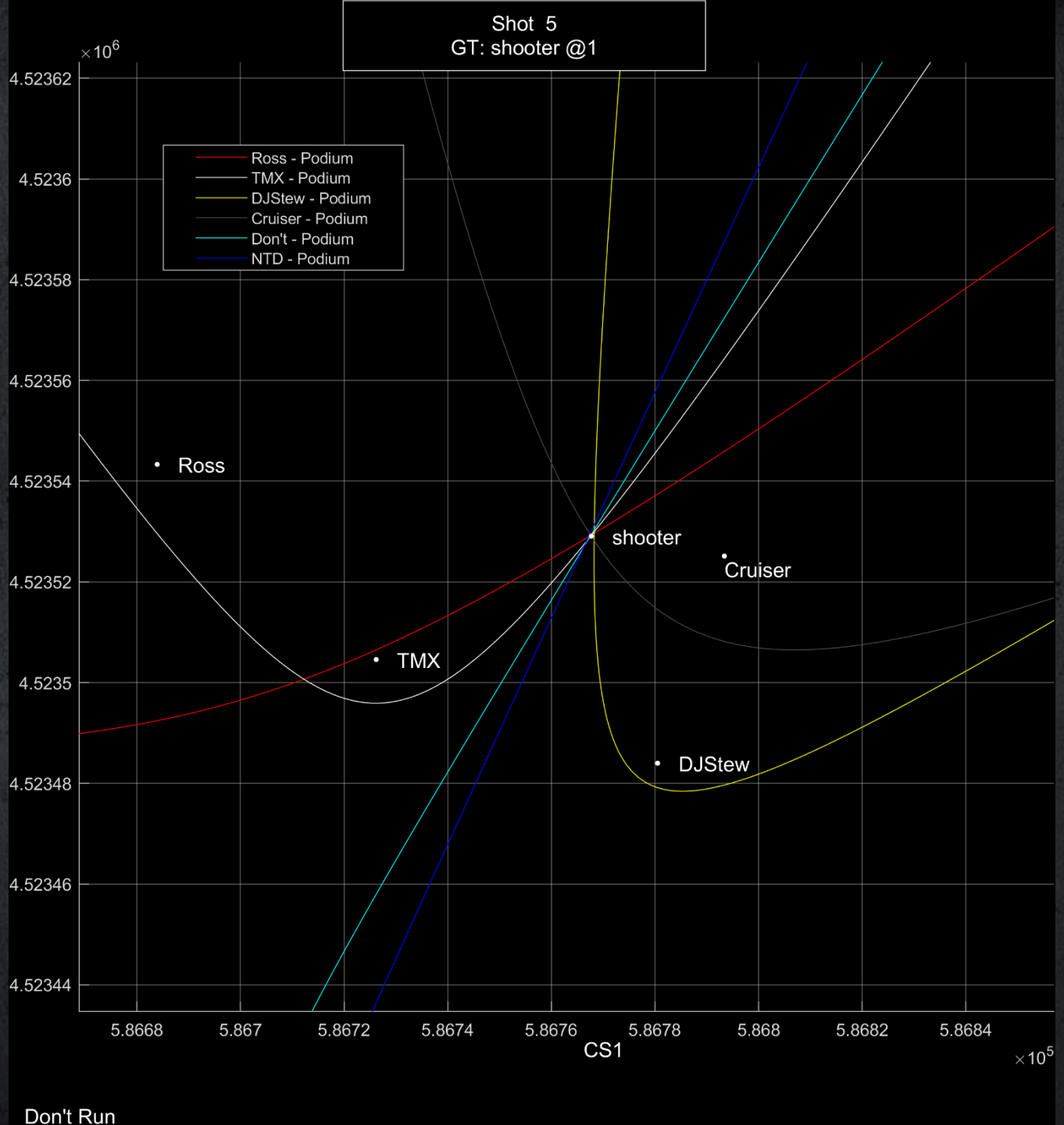
Don't Run


Shot 3
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
TMX
shooter
Cruiser
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

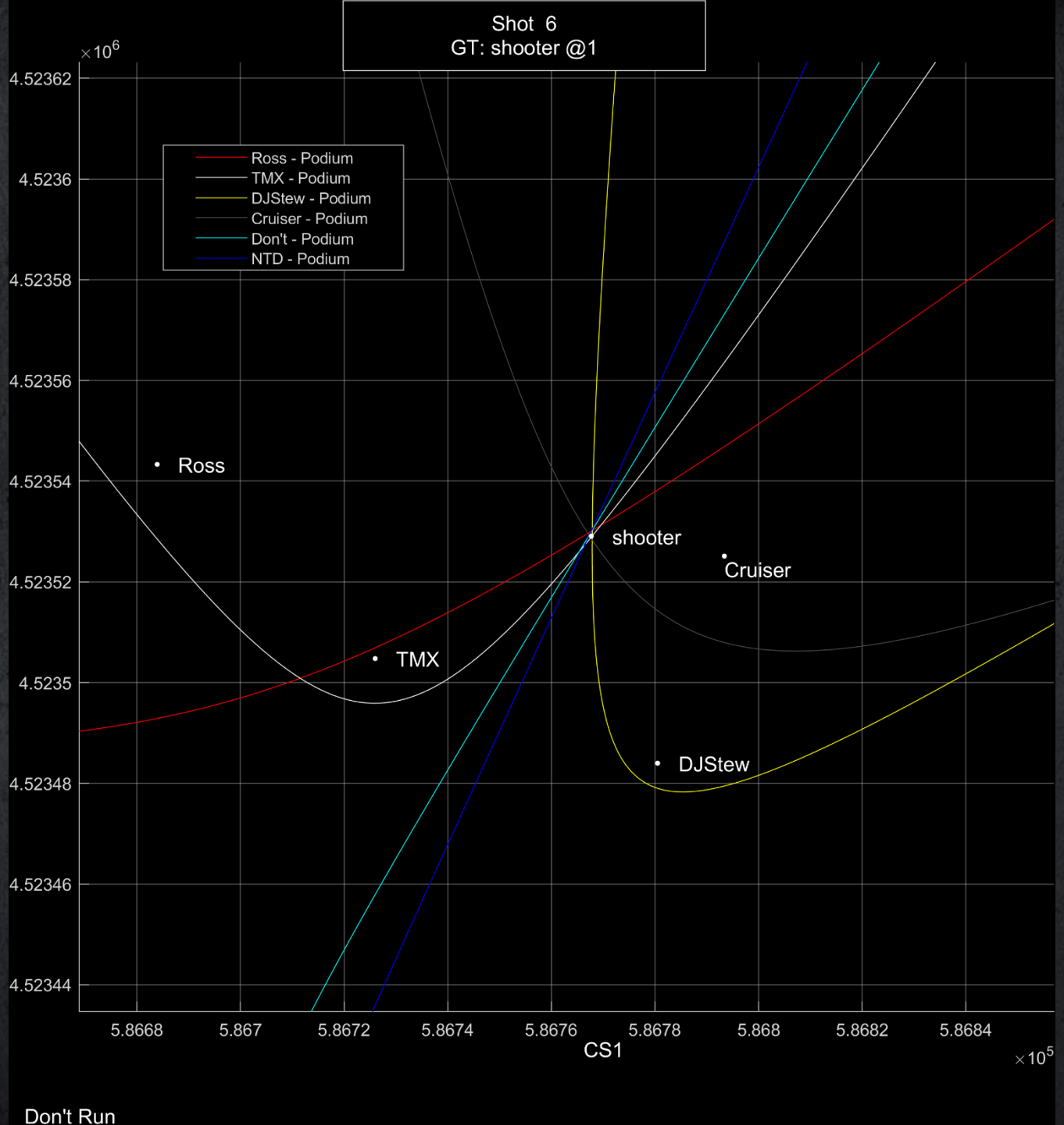
Don't Run


Shot 4
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
TMX
shooter
Cruiser
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

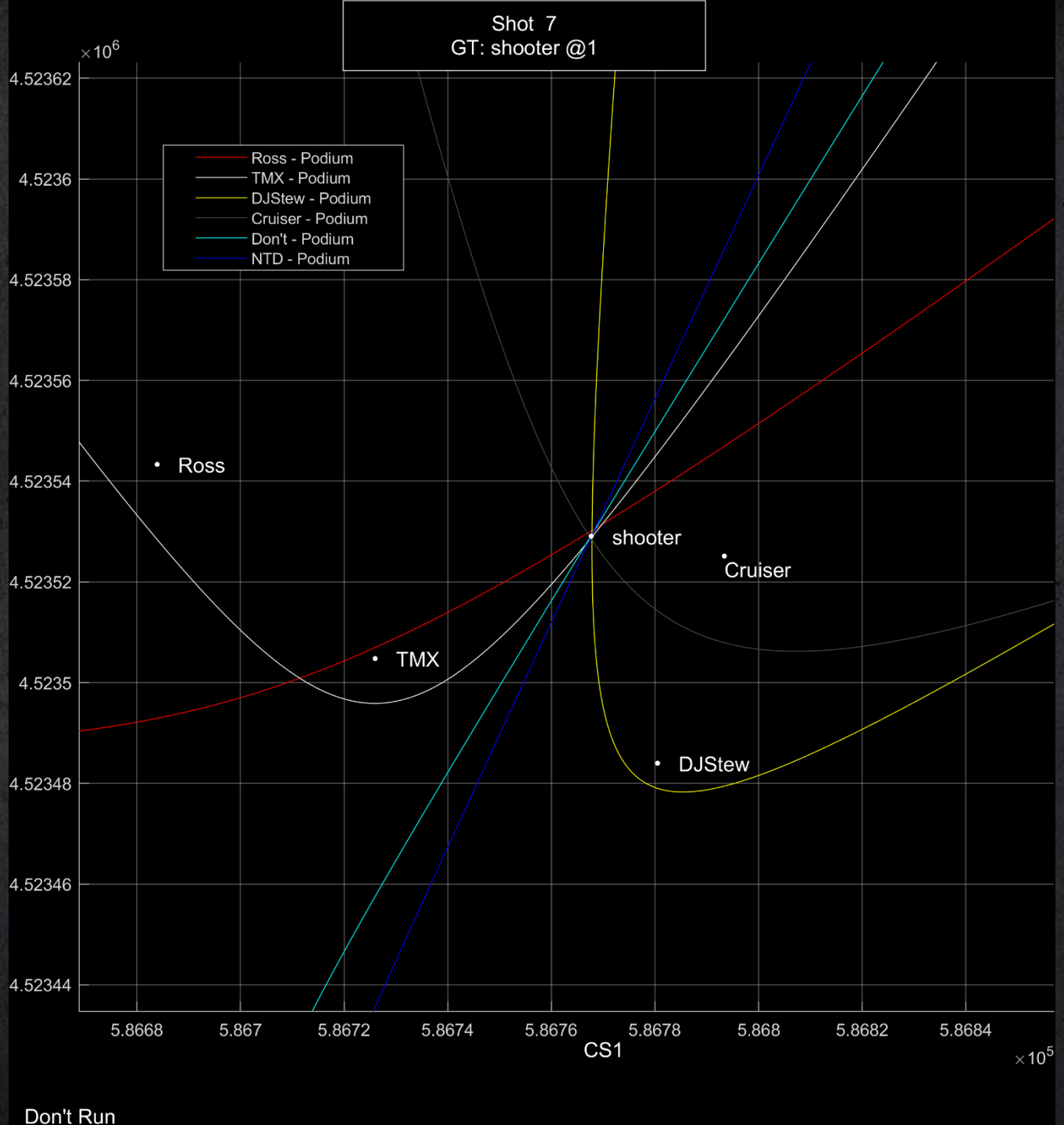
Don't Run


Shot 5
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
TMX
shooter
Cruiser
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

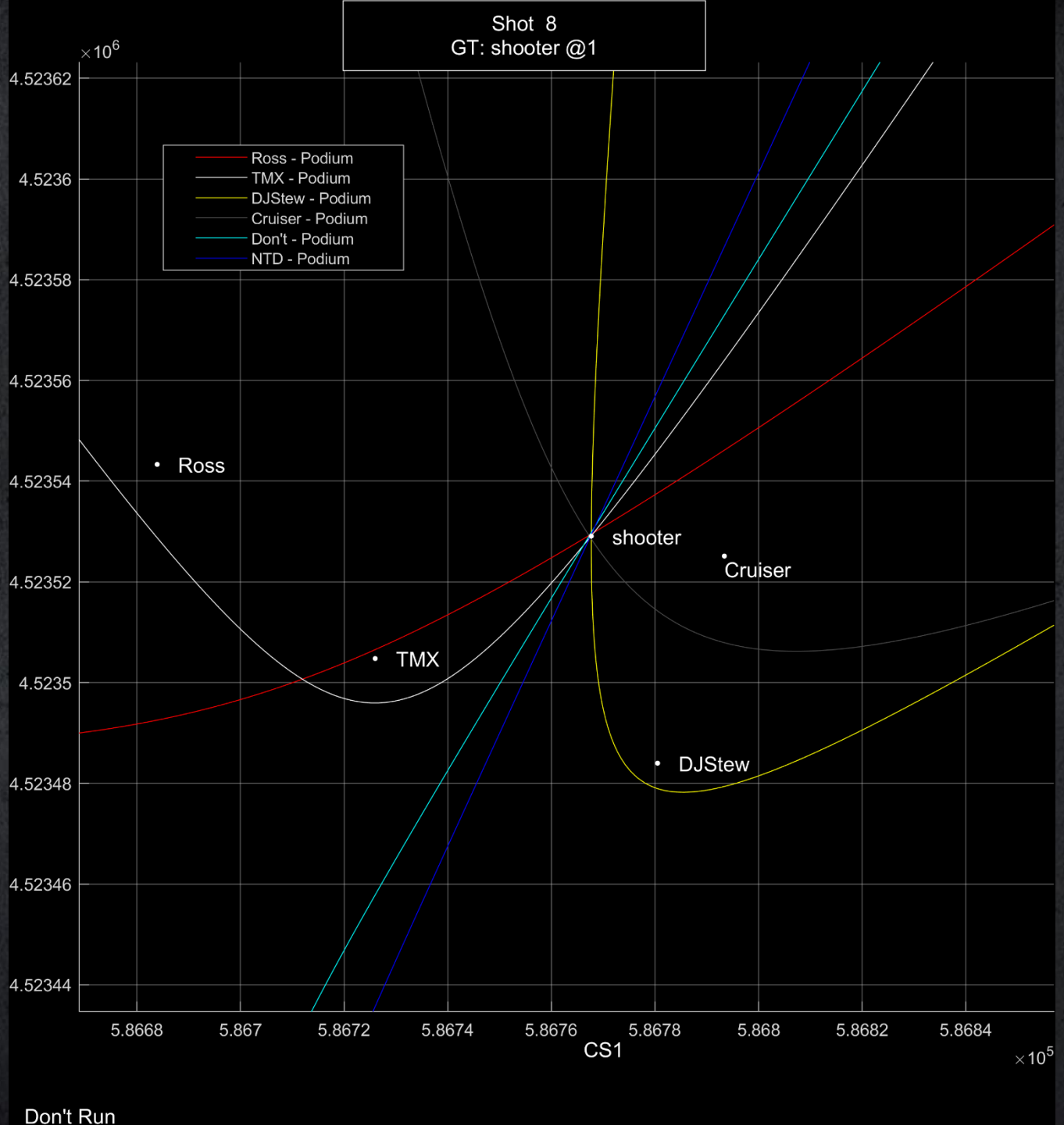
Don't Run


Shot 6
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

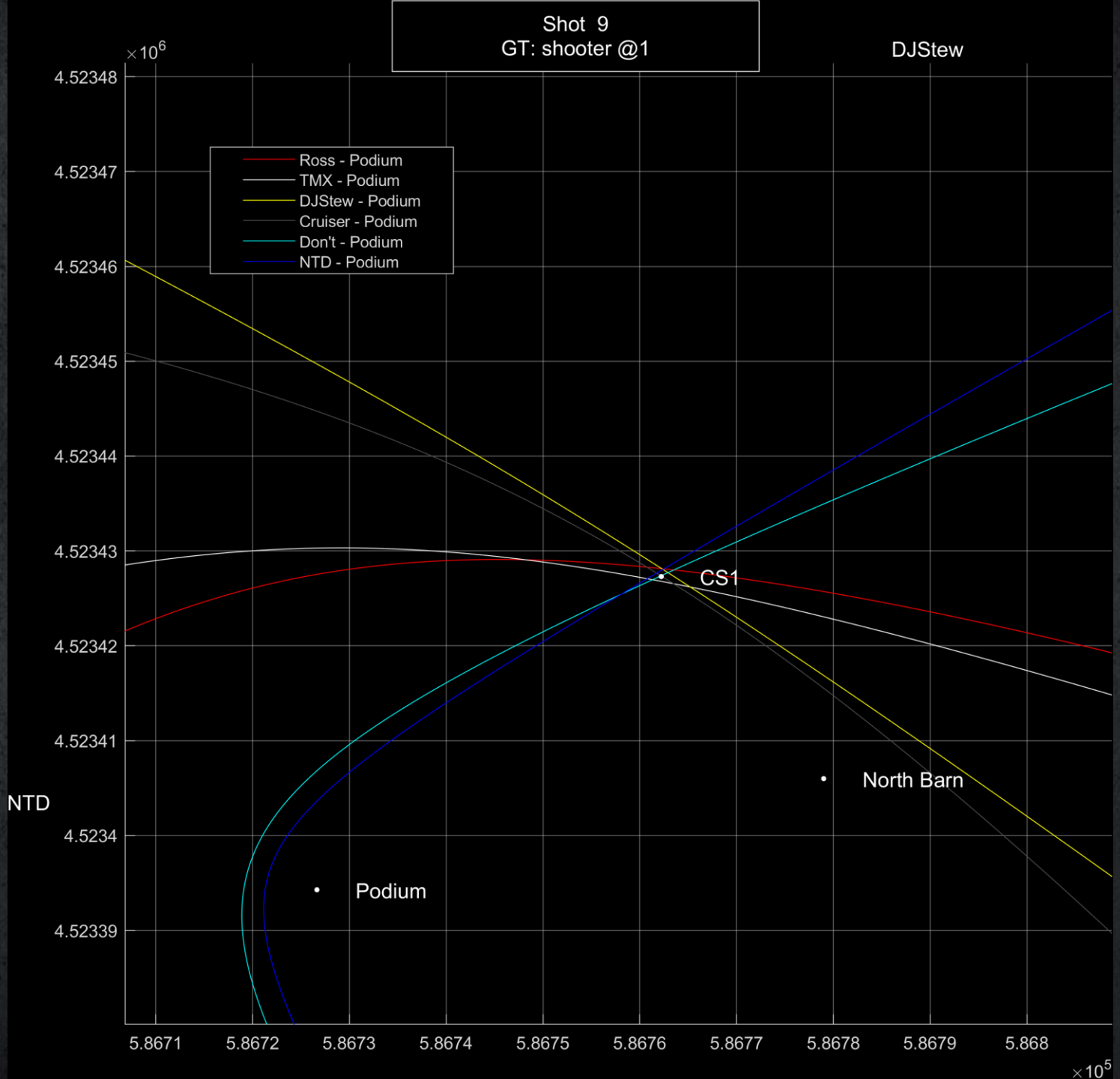
Don't Run

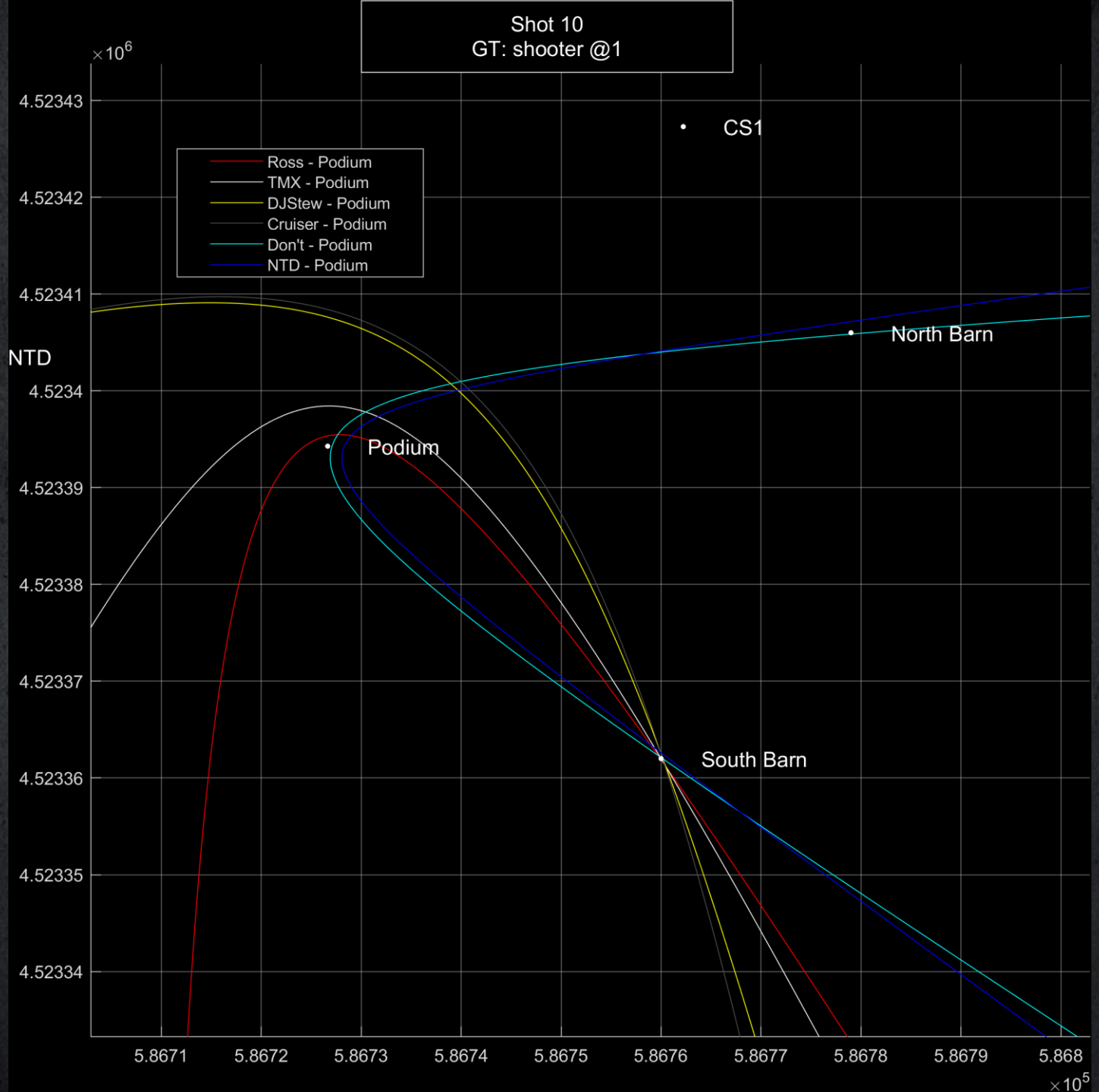

Shot 7
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
shooter
Cruiser
TMX
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

Don't Run


Shot 8
GT: shooter @1
×10^6
4.52362
4.5236
4.52358
4.52356
4.52354
4.52352
4.5235
4.52348
4.52346
4.52344
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
Ross
TMX
shooter
Cruiser
DJStew
5.8668
5.867
5.8672
5.8674
5.8676
5.8678
5.868
5.8682
5.8684
CS1
×10^5

Don't Run


Shot 9
GT: shooter @1
DJStew
×10^6
4.52348
4.52347
4.52346
4.52345
4.52344
4.52343
4.52342
4.52341
4.5234
4.52339
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
CS1
North Barn
Podium
NTD
5.8671
5.8672
5.8673
5.8674
5.8675
5.8676
5.8677
5.8678
5.8679
5.868
×10^5


Shot 10
GT: shooter @1
×10^6
4.52343
4.52342
4.52341
4.5234
4.52339
4.52338
4.52337
4.52336
4.52335
4.52334
NTD
CS1
North Barn
Podium
South Barn
Ross - Podium
TMX - Podium
DJStew - Podium
Cruiser - Podium
Don't - Podium
NTD - Podium
5.8671
5.8672
5.8673
5.8674
5.8675
5.8676
5.8677
5.8678
5.8679
5.868
×10^5

The timing data to produce these plots is found in “Audio Timestamps v4.xlsx”

The recording source location data is found in “Locations_v4.0.m”

The gunshot location results are presented in “greg_n TDOA v4.0.kmz”

I am aware of two issues with the data/results as currently presented:

1. For TMX, I have a location jump of 3m between shots 8 & 9, which seems physically implausible given there was only 0.9 second between these two shots.
2. The results for Shot 10 converge about 5m to the NW of the counter-sniper position on the South Barn, which leaves them floating in the air, just off to the West of the barn roof.

I suspect both of these issues to be caused by small errors in the locations of the recording devices, but after a good amount of experimentation, I have not been able to identify or correct whatever the issues are.


8
7
2
shooter
Cruiser
9
4
3
1
TMX
Implausible movement between Shots 4-8 and Shot 9
10
1
2
3
4
9
DJStew
Image © 2024 Airbus
Google Earth
1985
Imagery Date: 5/17/2023 17 T 586756.26 m E 4523507.82 m N elev 407 m eye alt 491 m


Shot 10 is 5m too
far too the West
10
9
TMX
DJStew
Shooter
Cruiser
North Barn
South Bar
Image Landsat / Copernicus
Image NOAA
Image © 2024 Airbus
Google Earth
1985
Imagery Date: 6/15/2024
17 T 586810.72 m E 4523491.08 m N
elev 412 m
eye alt 414 m