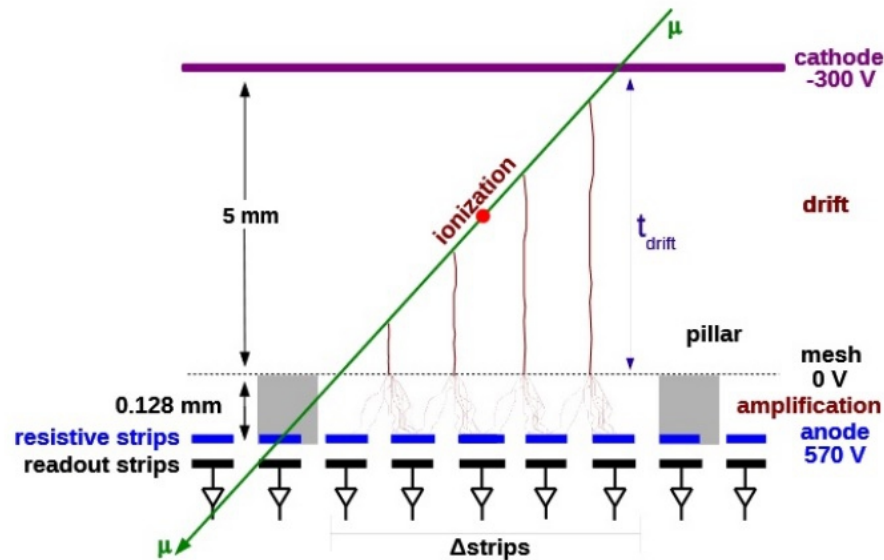


# Particle track analysis with ML



Schematic of a resistive strip micromegas detector (taken from [Lösel, 2017]).

Idea : train a neural network to reconstruct from a signal

# Data format

```
*****
*   Row   * Instance * out_charg * out_xpos * out_time * out_zPos * out_layer * out_track * out_track *
*****
*     0 *     0 *     183 * 675.0035 * 57.547012 * 1939.2 *     6 * 4.059e-05 * 532.63472 *
*     0 *     1 *     457 * 675.4285 * 83.191697 * 1939.2 *     6 * 4.059e-05 * 532.63472 *
*     0 *     2 *     480 * 675.8535 * 97.671507 * 1939.2 *     6 * 4.059e-05 * 532.63472 *
*     0 *     3 *     225 * 676.2785 * 105.45331 * 1939.2 *     6 * 4.059e-05 * 532.63472 *
*     0 *     4 *      96 * 676.7035 * 131.59313 * 1939.2 *     6 * 4.059e-05 * 532.63472 *
*     0 *     5 *      78 * 784.2285 * 105.78648 * 1939.2 *     6 * 4.059e-05 * 532.63472 *
*     1 *     0 *     112 * 942.7535 * 19.017442 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     1 *     1 *     222 * 943.1785 * 13.385013 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     1 *     2 *      93 * 943.6035 * 38.426794 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     1 *     3 *     101 * 944.0285 * 37.585999 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     1 *     4 *     112 * 945.3035 * 113.60661 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     1 *     5 *     161 * 945.7285 * 109.47327 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     1 *     6 *      98 * 946.1535 * 139.83771 * 1939.2 *     6 * -0.000626 * 759.10063 *
*     2 *     0 *     120 * 968.6785 * 23.243884 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     1 *     367 * 969.1035 * 13.577768 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     2 *      84 * 969.5285 * 38.838343 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     3 *     112 * 969.9535 * 53.189979 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     4 *     177 * 970.3785 * 67.682497 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     5 *     135 * 970.8035 * 68.045888 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     6 *     106 * 971.2285 * 100.33274 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     2 *     7 *     100 * 971.6535 * 86.659429 * 1939.2 *     6 * -0.000146 * 783.26271 *
*     3 *     0 *     103 * 677.5535 * 6.3363393 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     3 *     1 *     300 * 677.9785 * 35.786334 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     3 *     2 *     246 * 678.4035 * 39.579367 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     3 *     3 *     172 * 678.8285 * 70.438689 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     3 *     4 *     262 * 679.2535 * 91.869223 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     3 *     5 *     195 * 679.6785 * 98.587648 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     3 *     6 *     112 * 680.1035 * 114.66507 * 1939.2 *     6 * -0.001481 * 537.85800 *
*     4 *     0 *      80 * 964.8535 * 28.891208 * 1939.2 *     6 * -6.65e-05 * 779.40312 *
*     4 *     1 *     128 * 965.2785 * 18.836977 * 1939.2 *     6 * -6.65e-05 * 779.40312 *
*     4 *     2 *     115 * 965.7035 * 34.637003 * 1939.2 *     6 * -6.65e-05 * 779.40312 *
```

## Trial Status

batch_size	l1	l2	l3	lr	iter	total time (s)	val_loss	train_loss
500	128	256	64	0.000908737	2000	220.586	2.20872	2.06742
100	256	64	64	0.000160904	2000	453.326	1.10813	0.799658
500	128	256	64	0.00084883	2000	217.955	2.04129	1.88203
100	64	64	128	0.000123593	2000	454.693	1.77215	1.49448
100	128	128	256	0.000209438	2000	473.594	1.97107	1.64839
500	64	64	128	0.000413835	2000	138.852	1.20463	0.965263
100	256	128	256	0.000357935	2000	509.326	1.16637	1.03531
100	64	256	128	0.000106727	2000	465.898	1.67774	1.26074
100	256	128	64	0.000187086	2000	451.816	1.33823	0.887039
500	128	64	64	0.000194987	2000	138.102	1.22154	1.03478
500	256	128	256	0.000318933	2000	285.274	1.44953	1.10081
100	256	64	64	0.000467938	2000	453.951	1.19805	1.08319
100	256	64	64	0.000170459	2000	448.99	1.37717	1.10824
500	64	256	256	0.000149166	2000	363.414	1.60126	1.3166
100	256	256	64	0.000121581	2000	632.984	1.39104	0.960806
100	256	128	128	0.000470885	2000	458.175	1.09862	0.993037
500	64	64	128	0.000353587	2000	162.305	1.45437	1.11349
100	128	128	256	0.000398704	2000	519.618	1.37149	1.26973
100	256	128	128	0.000509403	2000	489.605	1.07688	0.894697
500	256	256	256	0.000202187	2000	549.089	3.35288	3.00974

256\_128\_128\_Adamw\_BS100

