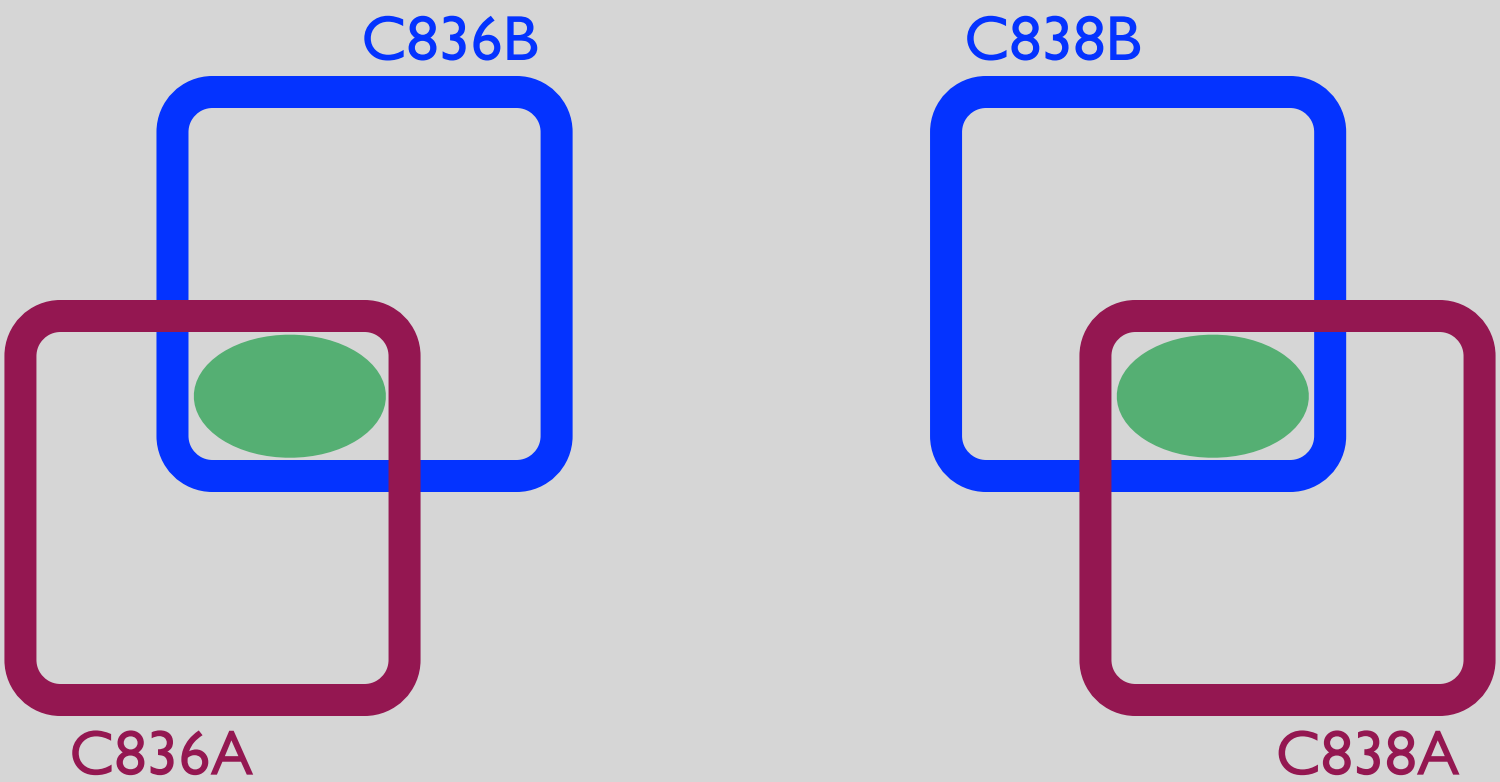
MI8 line Collimator Scan

Ming-Jen Yang

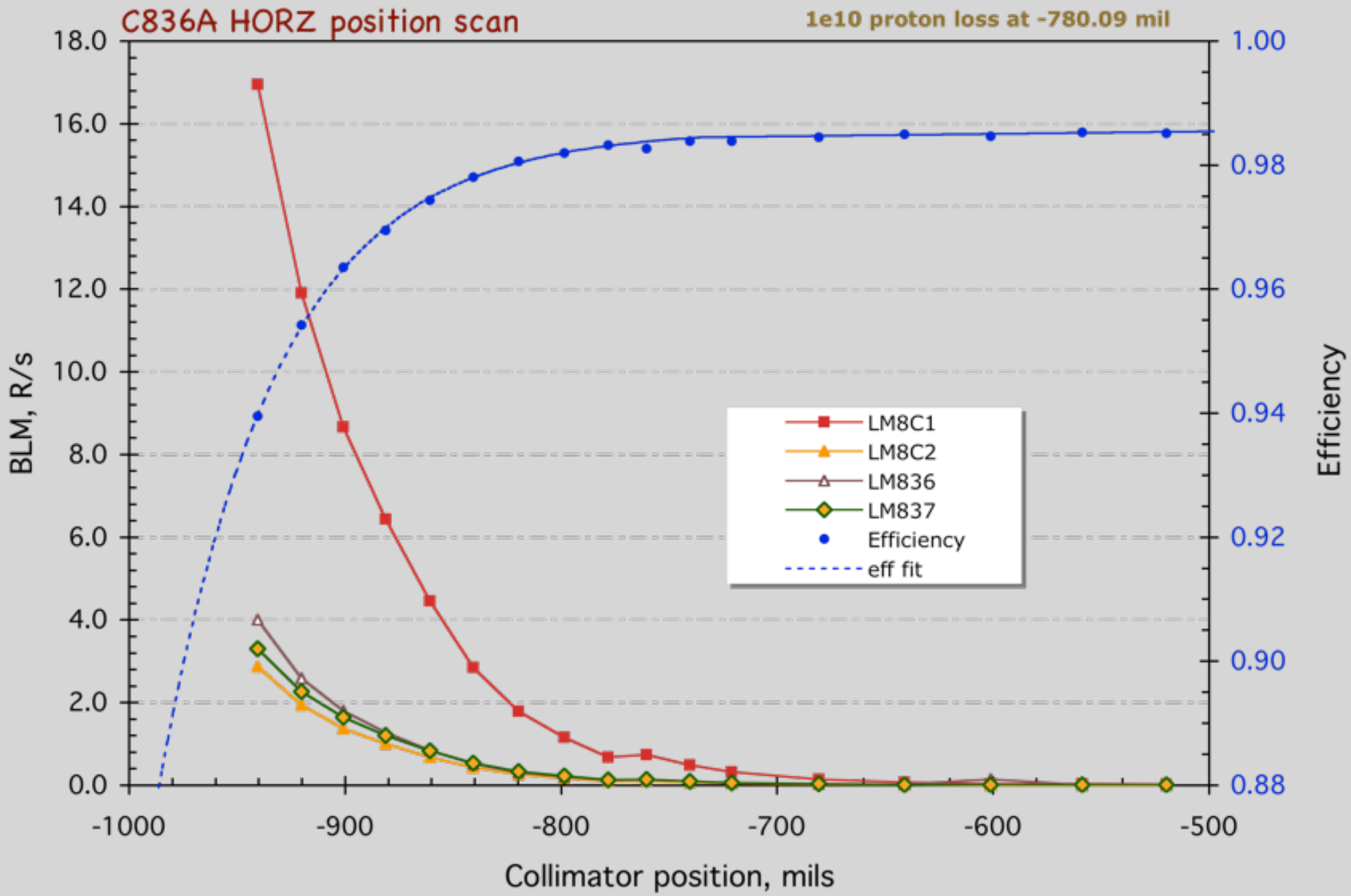
09/13/2010

Collimation geometry

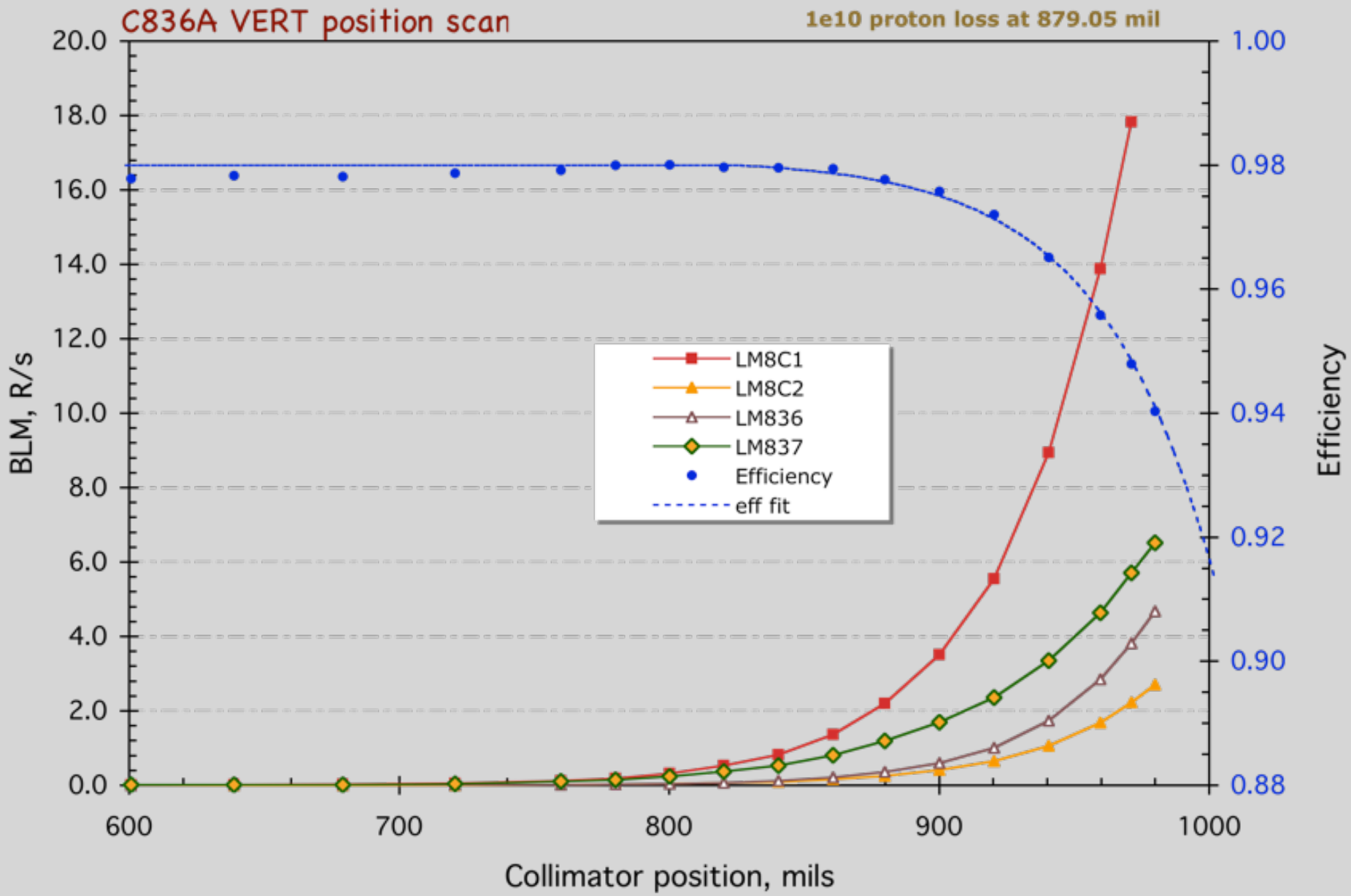


- Looking along proton direction
- Left is wall side

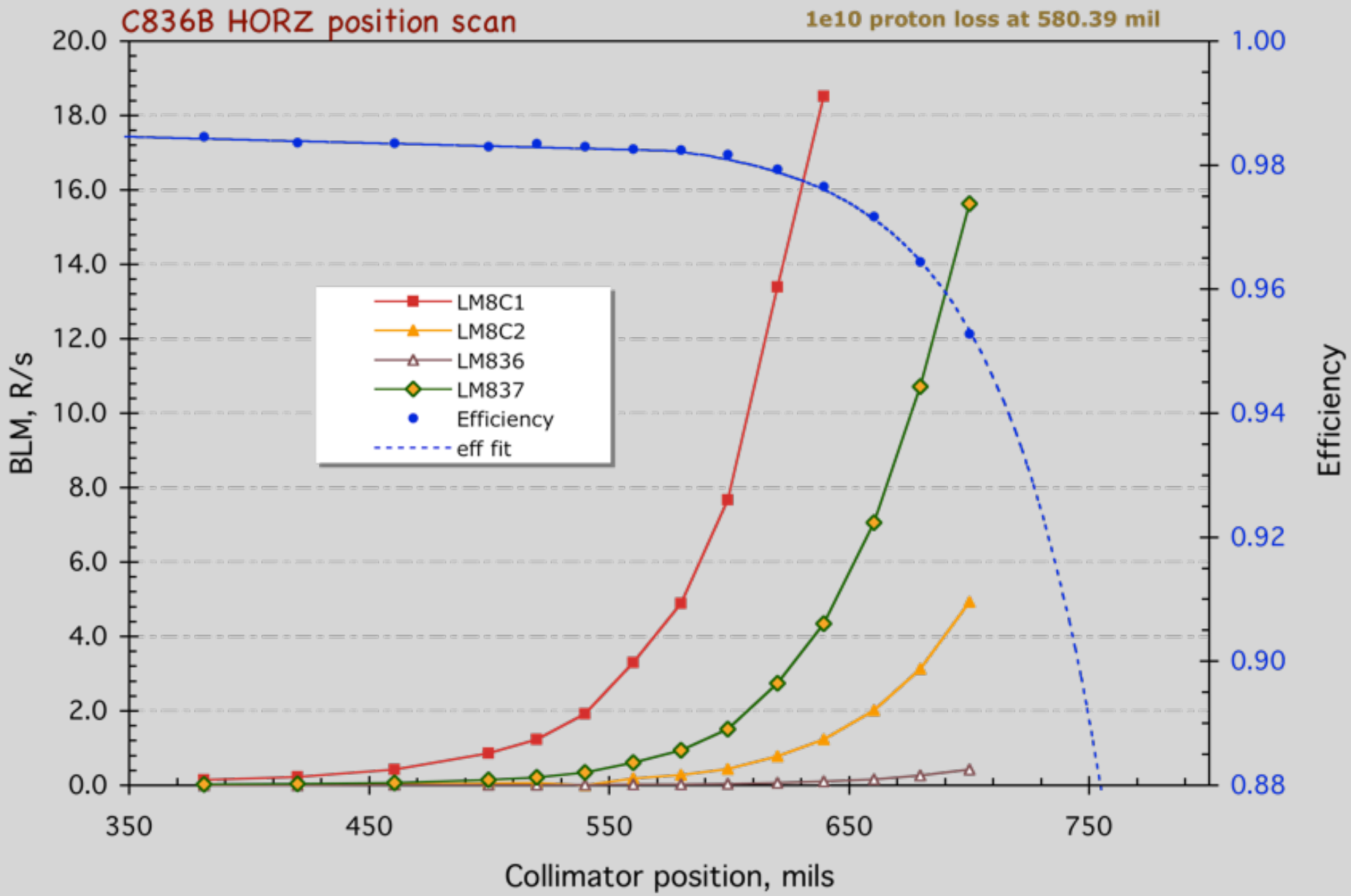
C836A, horizontal scan



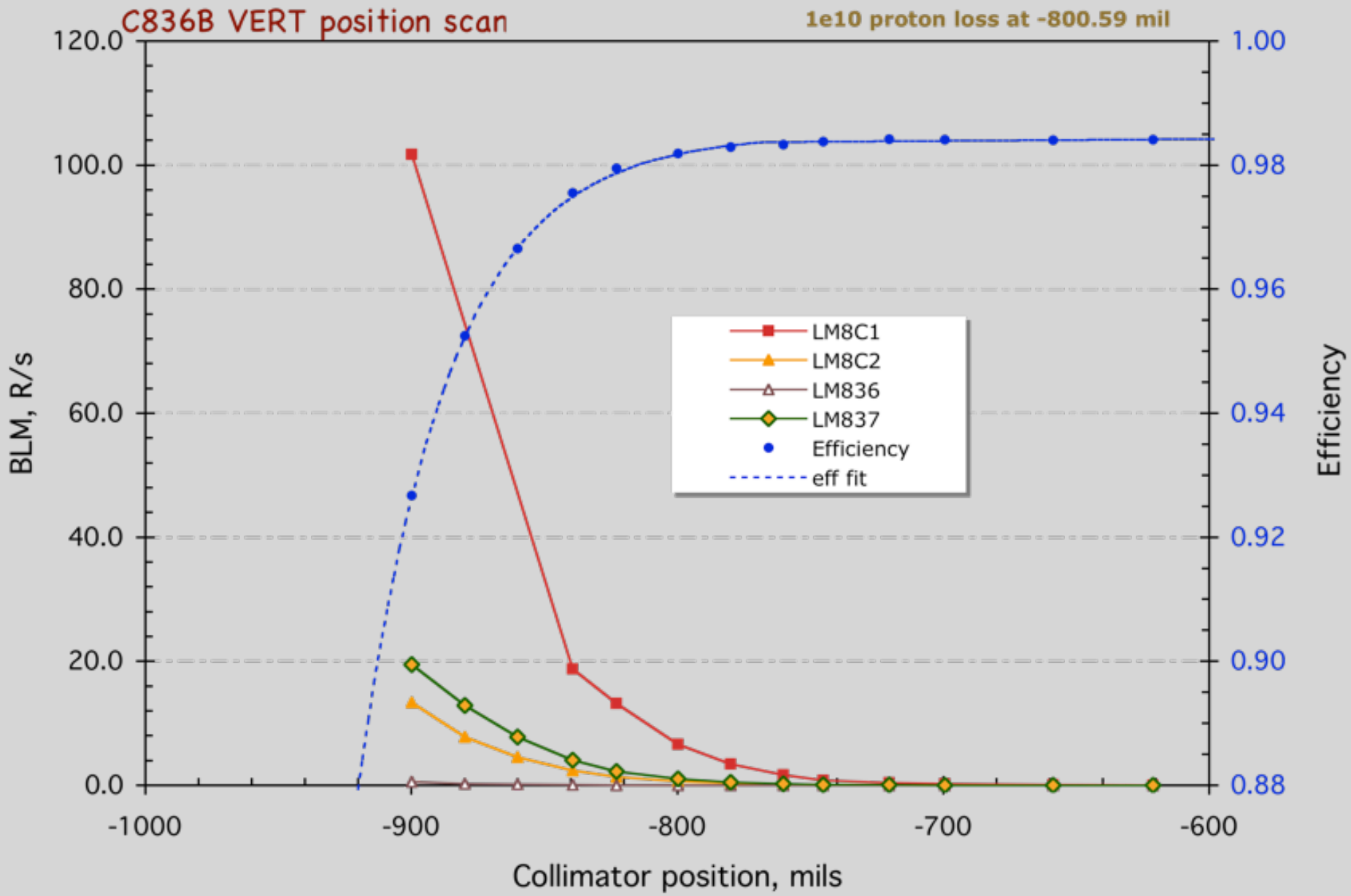
C836A, vertical scan



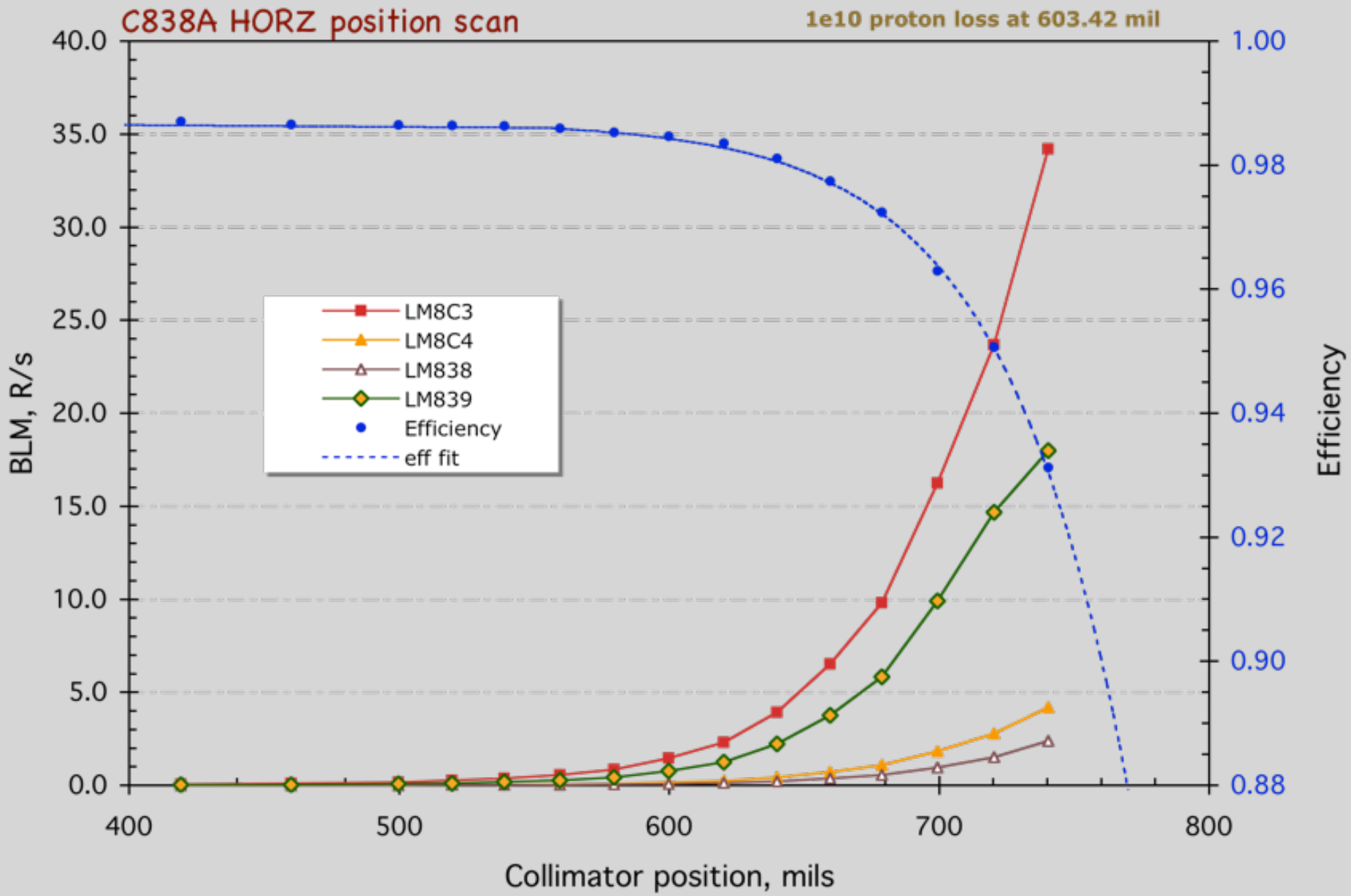
C836B, horizontal scan



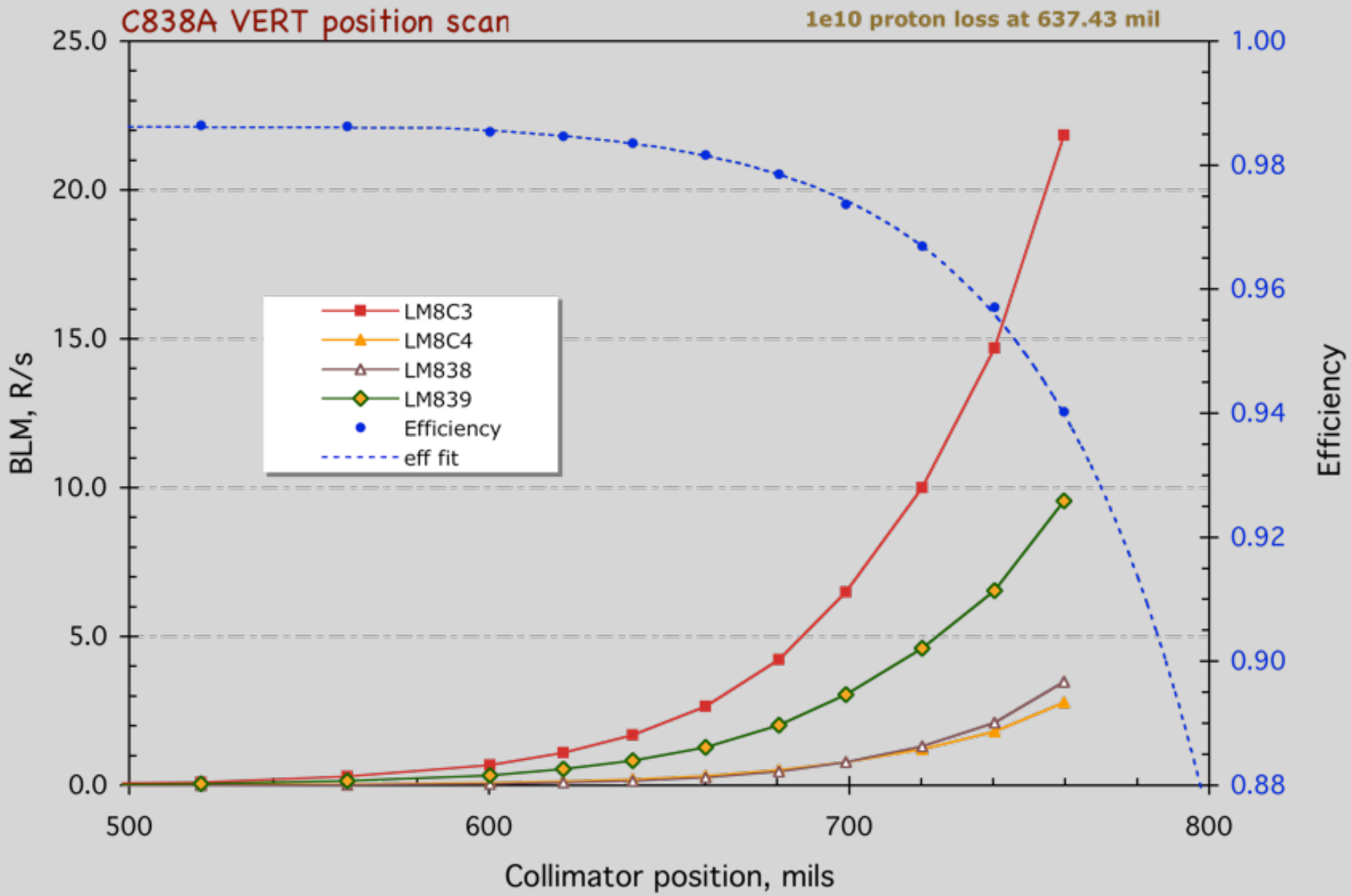
C836B, vertical scan



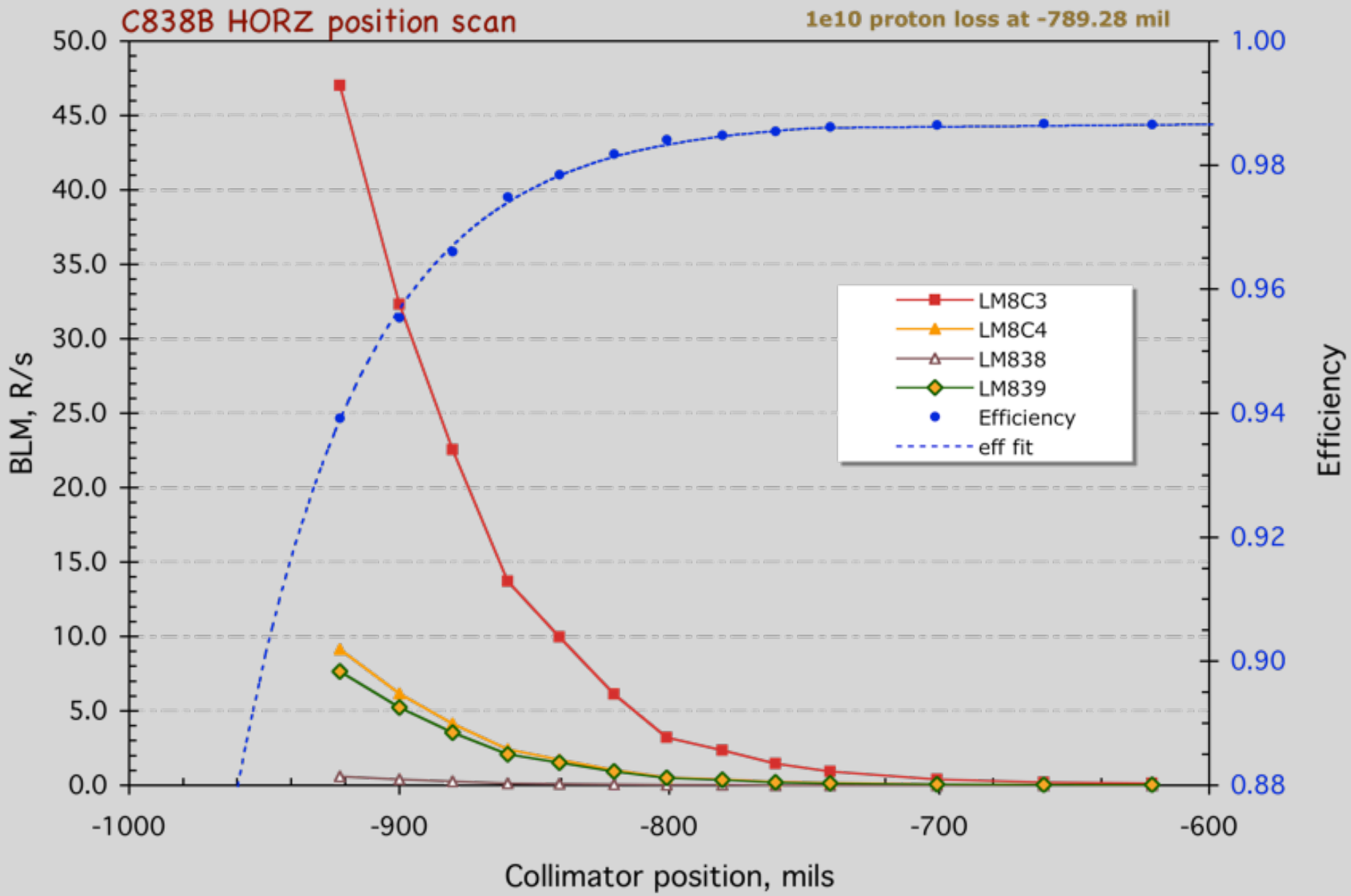
C838A, horizontal scan



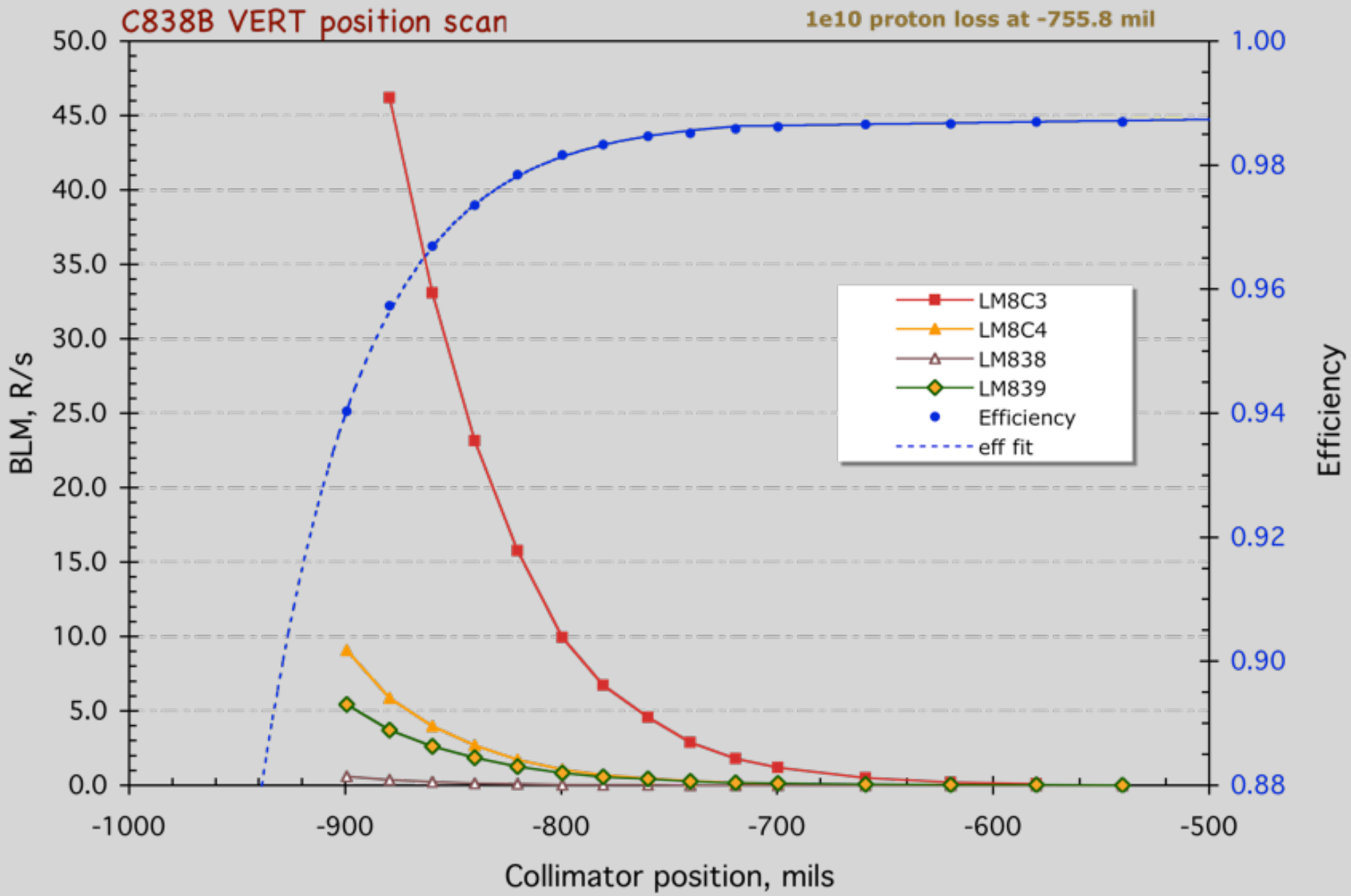
C838A, vertical scan



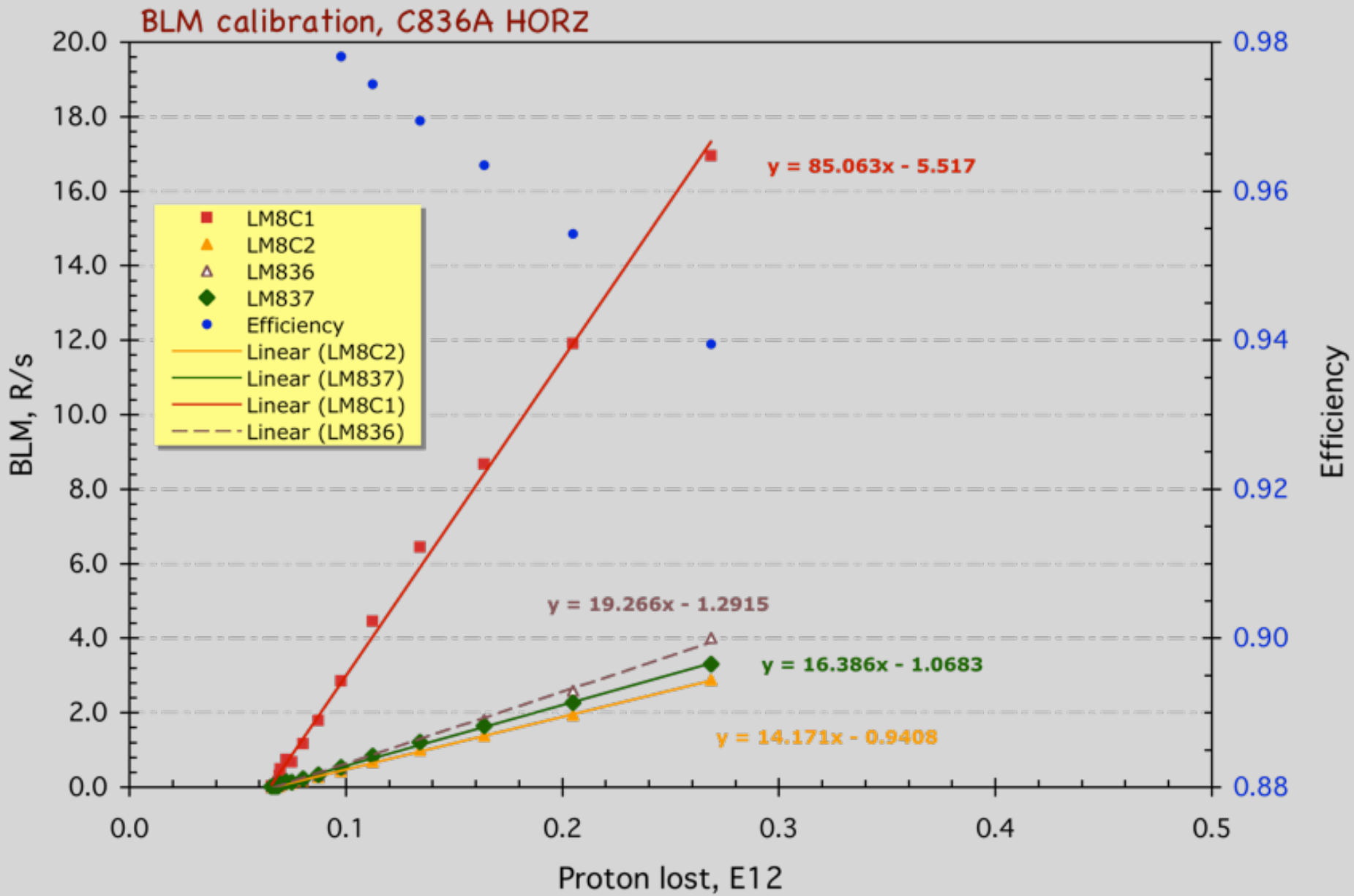
C838B, horizontal scan



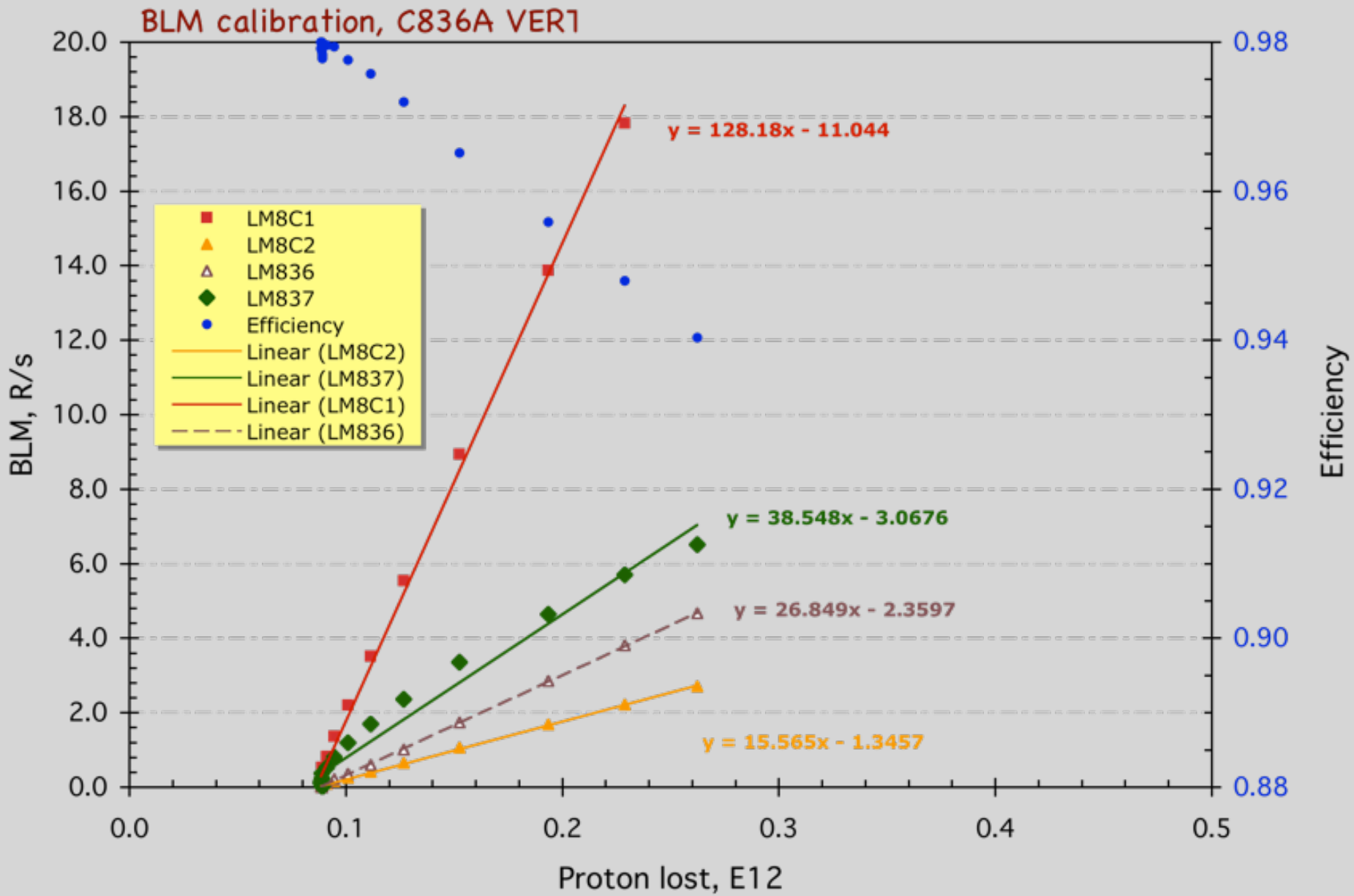
C838B, vertical scan



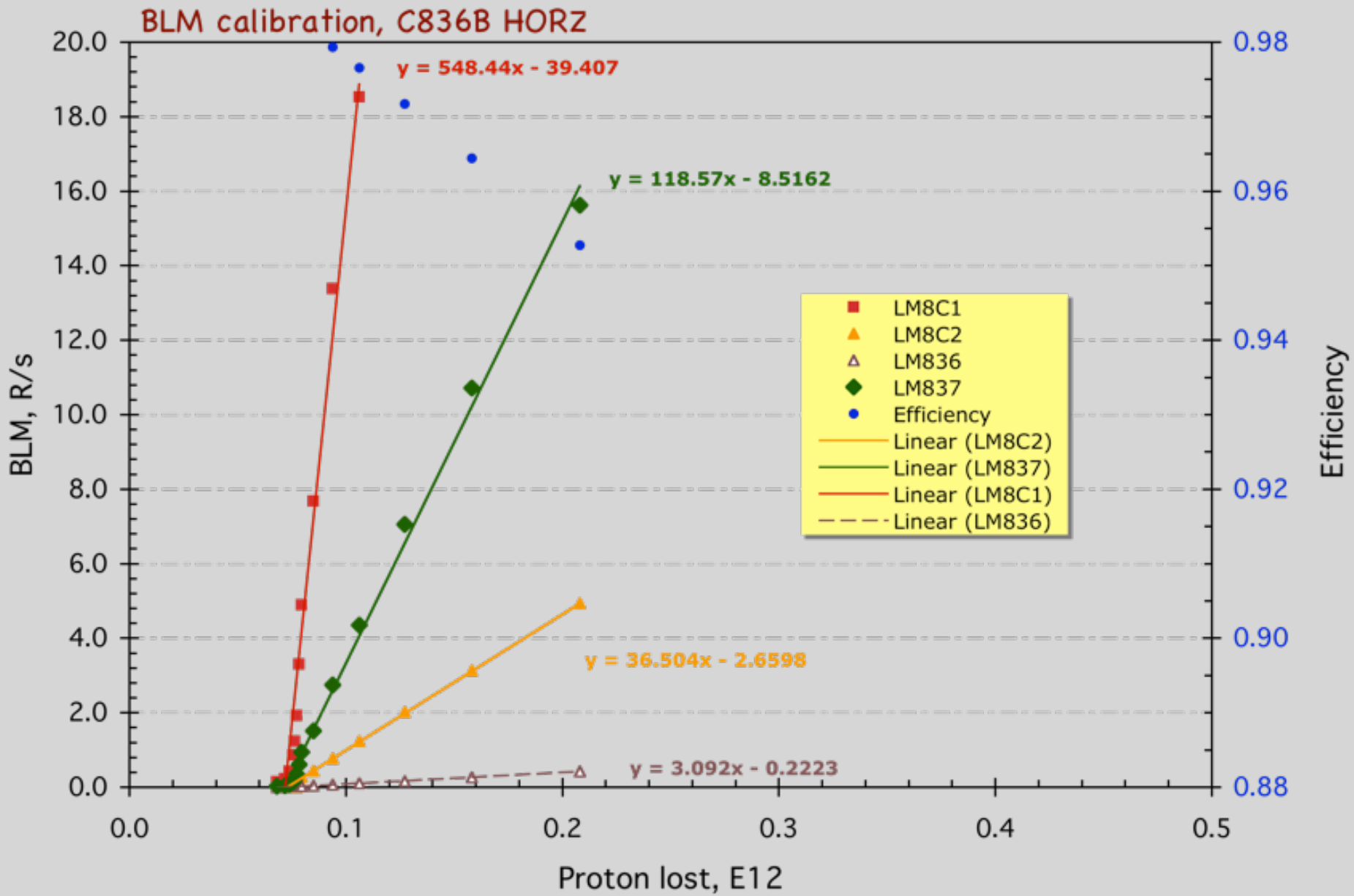
BLM calibration, C836A horizontal



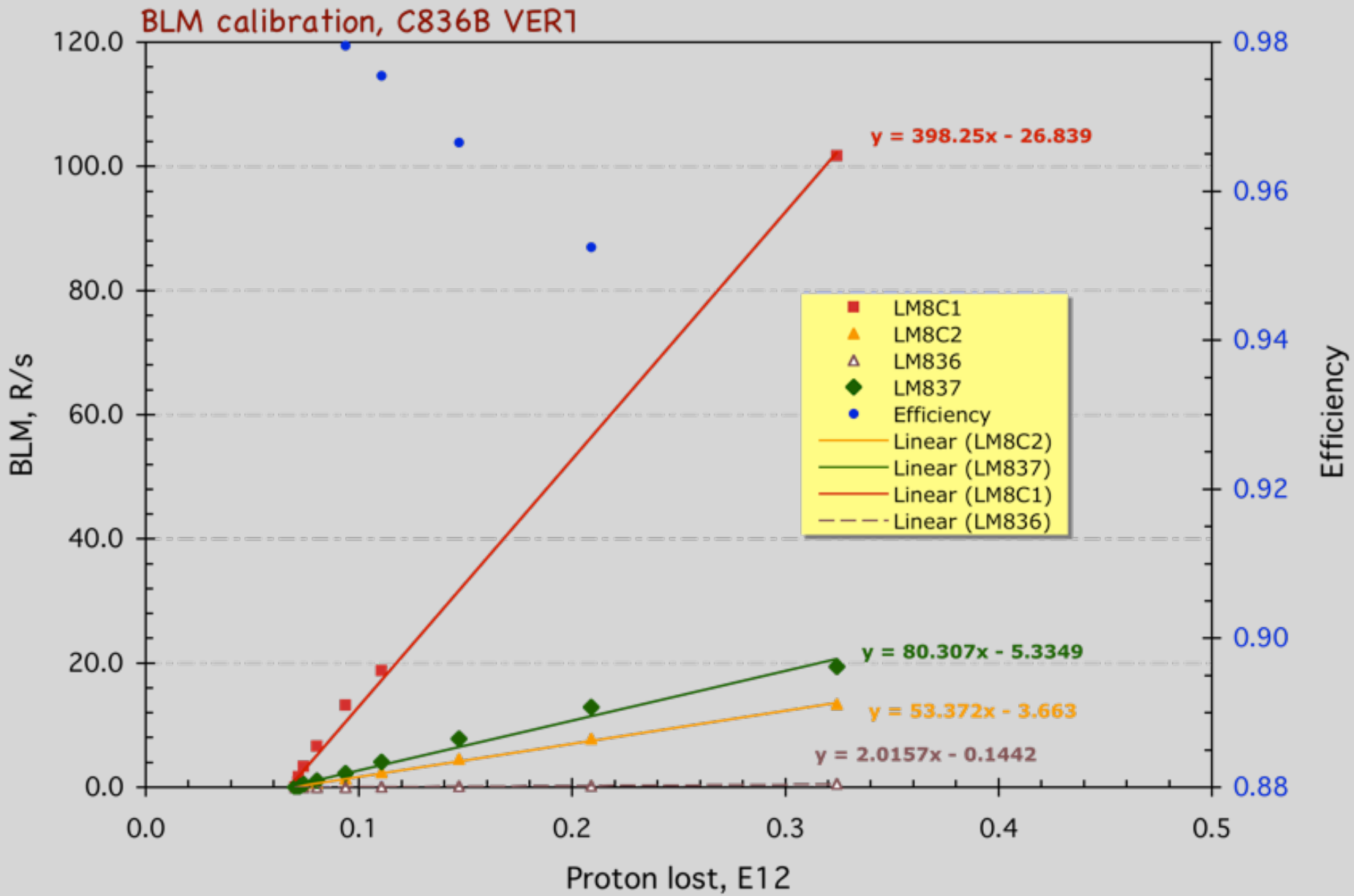
BLM calibration, C836A vertical



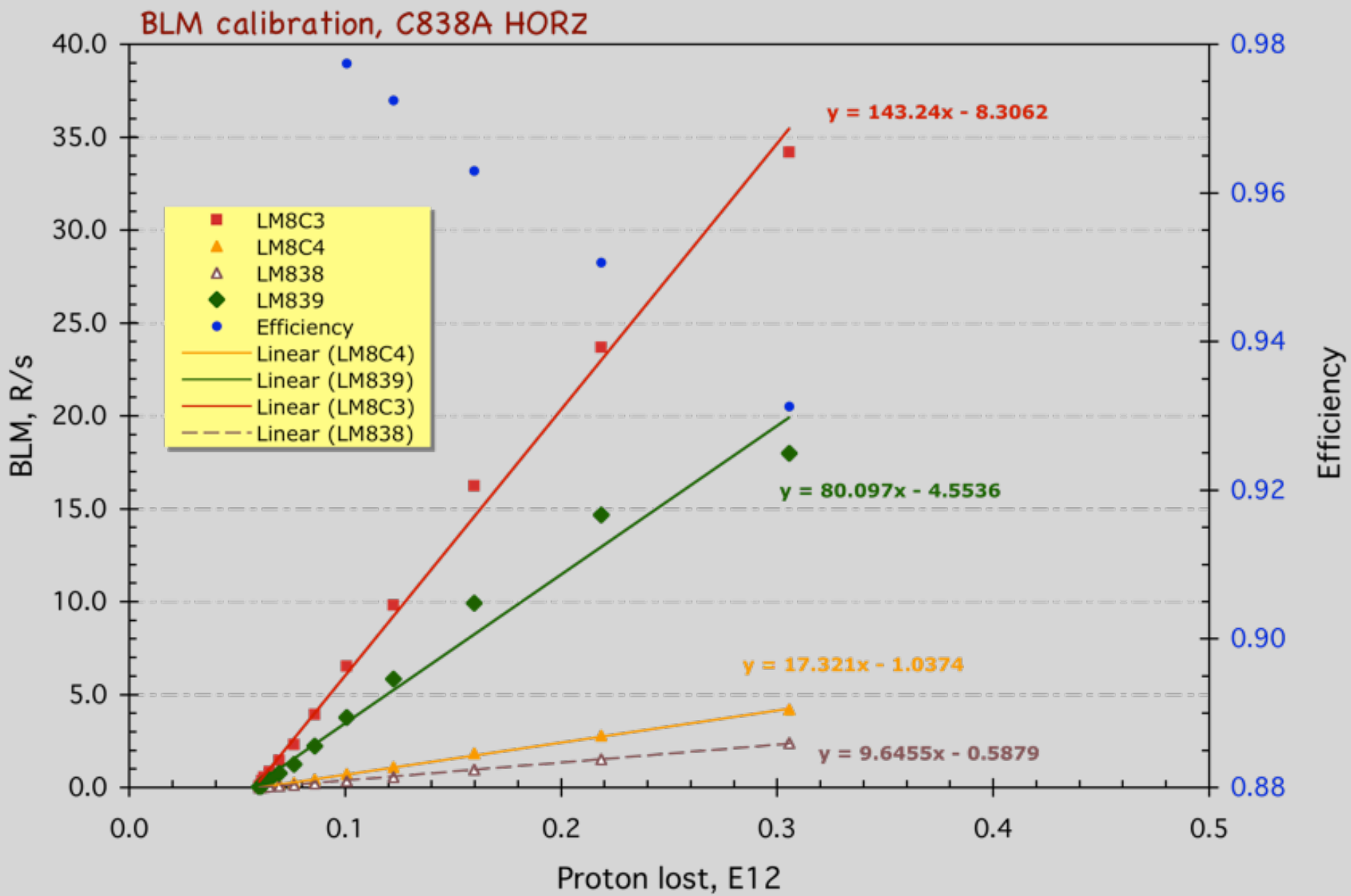
BLM calibration, C836B horizontal



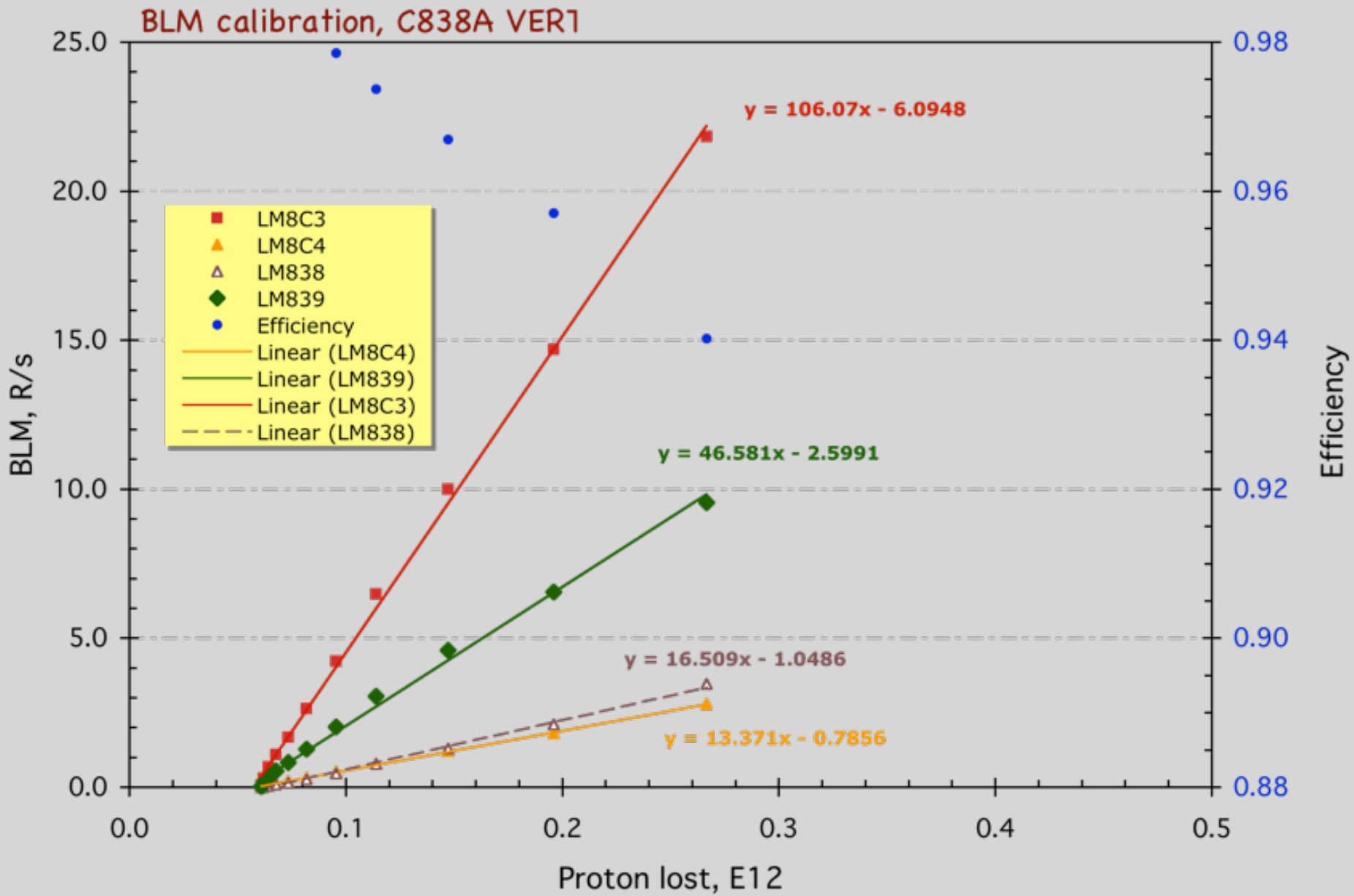
BLM calibration, C836B vertical



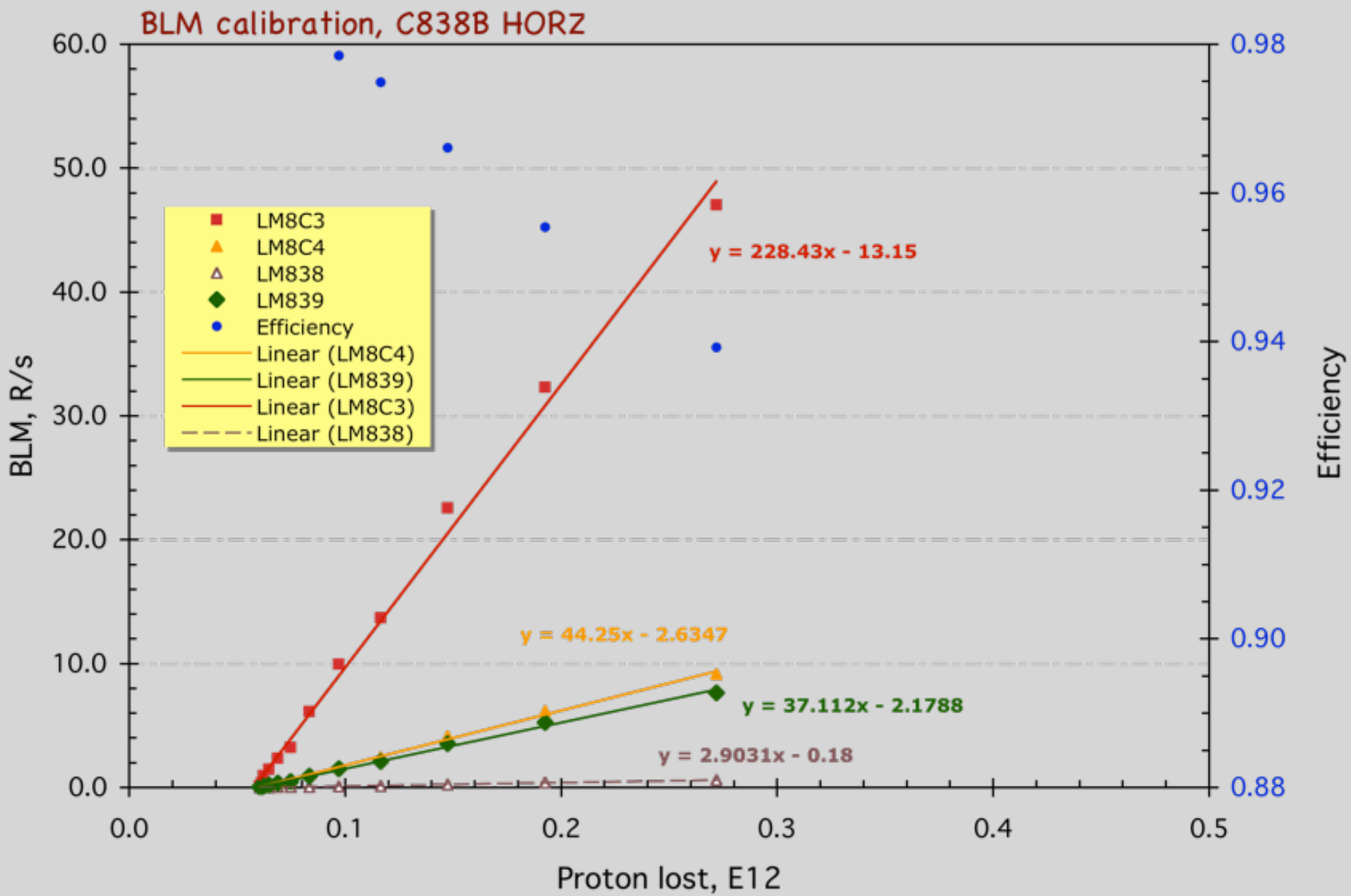
BLM calibration, C838A horizontal



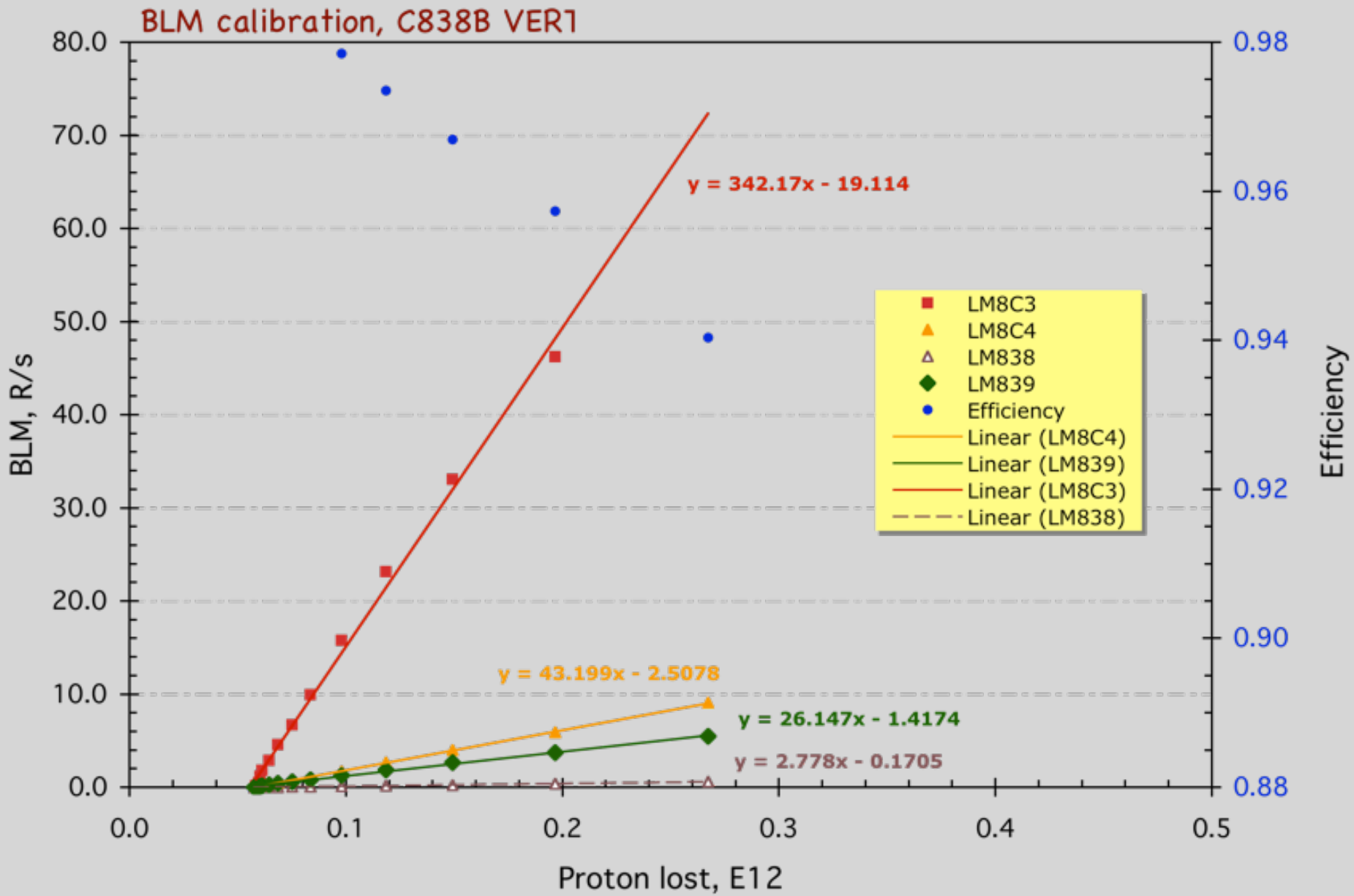
BLM calibration, C838A vertical



BLM calibration, C838B horizontal



BLM calibration, C838B vertical



Results

Response matrix, (R/S)/e12

	C836AH	C836AV	C836BH	C836BV	C838AH	C838AV	C838BH	C838BV
LM8C1/C3	85.063	128.18	548.44	398.25	143.24	106.07	228.43	342.17
LM8C2/C4	14.171	15.565	36.504	53.372	17.321	13.371	44.25	43.199
LM836/838	19.266	26.849	3.092	2.0157	9.6455	16.509	2.9031	2.778
LM837/839	16.386	38.548	118.57	80.307	80.097	46.581	37.112	43.199

Collimator positions per protons lost, mils

	C836AH	C836AV	C836BH	C836BV	C838AH	C838AV	C838BH	C838BV
0.5 e10	-745.96	859.88	466.2534	-784.07	579.94	614.07	-763.87	-724.8
1.0 e10	-780.09	879.05	580.39	-800.59	603.42	637.43	-789.28	-755.8

Expected BLM reading in R/S, @1e10

	C836AH	C836AV	C836BH	C836BV	
LM8C1	0.851	1.282	5.484	3.983	11.600
LM8C2	0.142	0.156	0.365	0.534	1.200
LM836	0.193	0.268	0.031	0.020	0.510
LM837	0.164	0.385	1.186	0.803	2.540

	C838AH	C838AV	C838BH	C838BV	
LM8C3	1.432	1.061	2.284	3.422	8.200
LM8C4	0.173	0.134	0.443	0.432	1.180
LM838	0.096	0.165	0.029	0.028	0.320
LM839	0.801	0.466	0.371	0.432	2.070

Proton loss matrix

Measurements from collimator scan

$$\begin{bmatrix} L_1 \\ L_2 \end{bmatrix} = \begin{pmatrix} r_{1A} & r_{1B} \\ r_{2A} & r_{2B} \end{pmatrix} \begin{bmatrix} P_A \\ P_B \end{bmatrix}$$

$$\begin{bmatrix} P_A \\ P_B \end{bmatrix} = \mathcal{R}^{-1} \begin{bmatrix} L_1 \\ L_2 \end{bmatrix}$$

Protons scrapped

Measured during operation

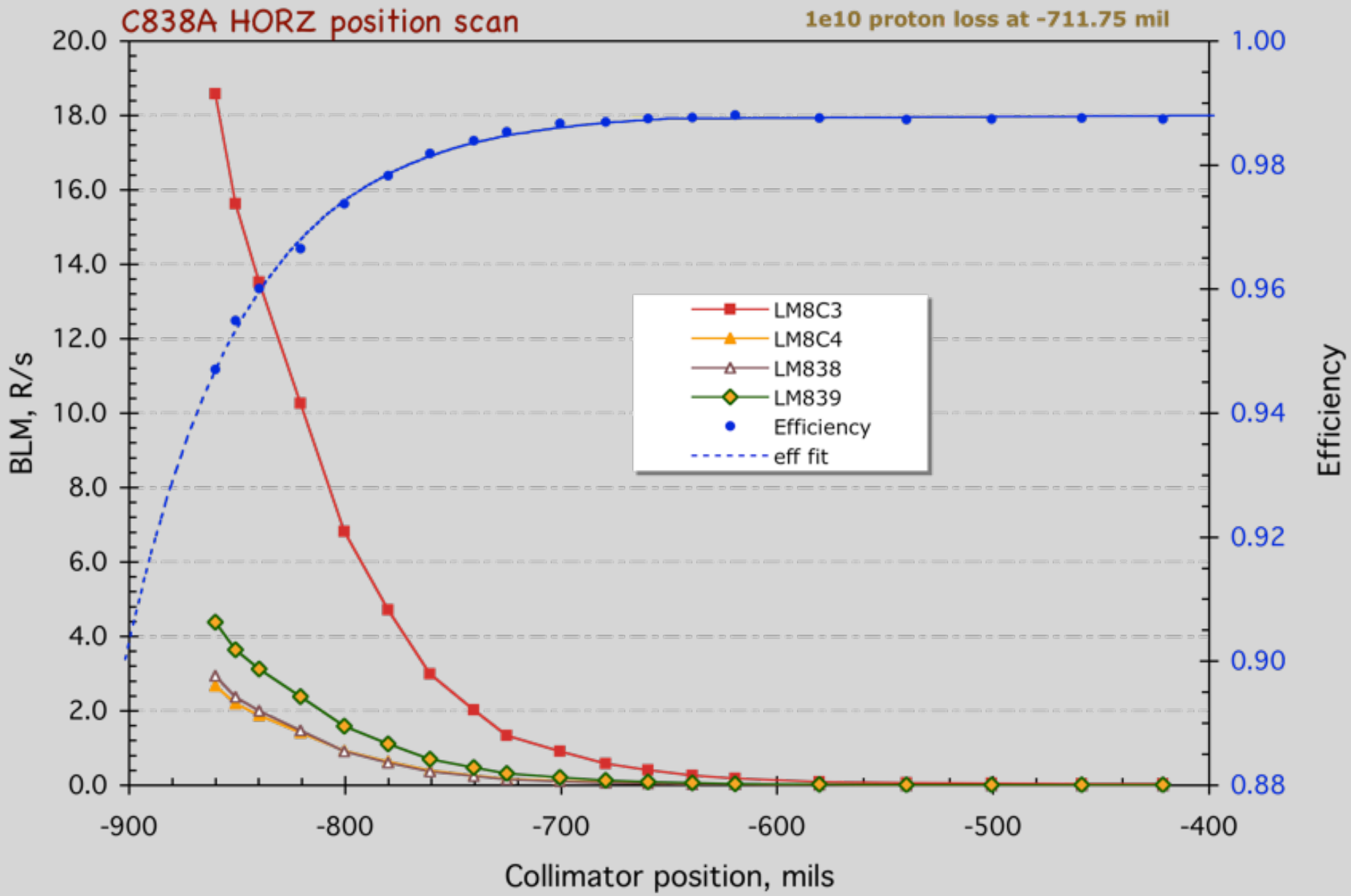
Summary

- Data is quite reasonable
- Asymmetry
  - Between 836 and 838 collimator data.
  - Need to scan the opposite edge of C836
    - Horizontal plane only.
  - Repositioning BLMs to equalize the responses
    - Between horizontal and vertical edges.
- Collimator abort
  - Need to increase abort limit
    - Short term solution.
  - Creating pseudo (MOOC) devices
    - Scaled for number of protons scrapped.
      - ✓ Example: I:C836AP, I:C836BP, I:C838AP, I:C838BP

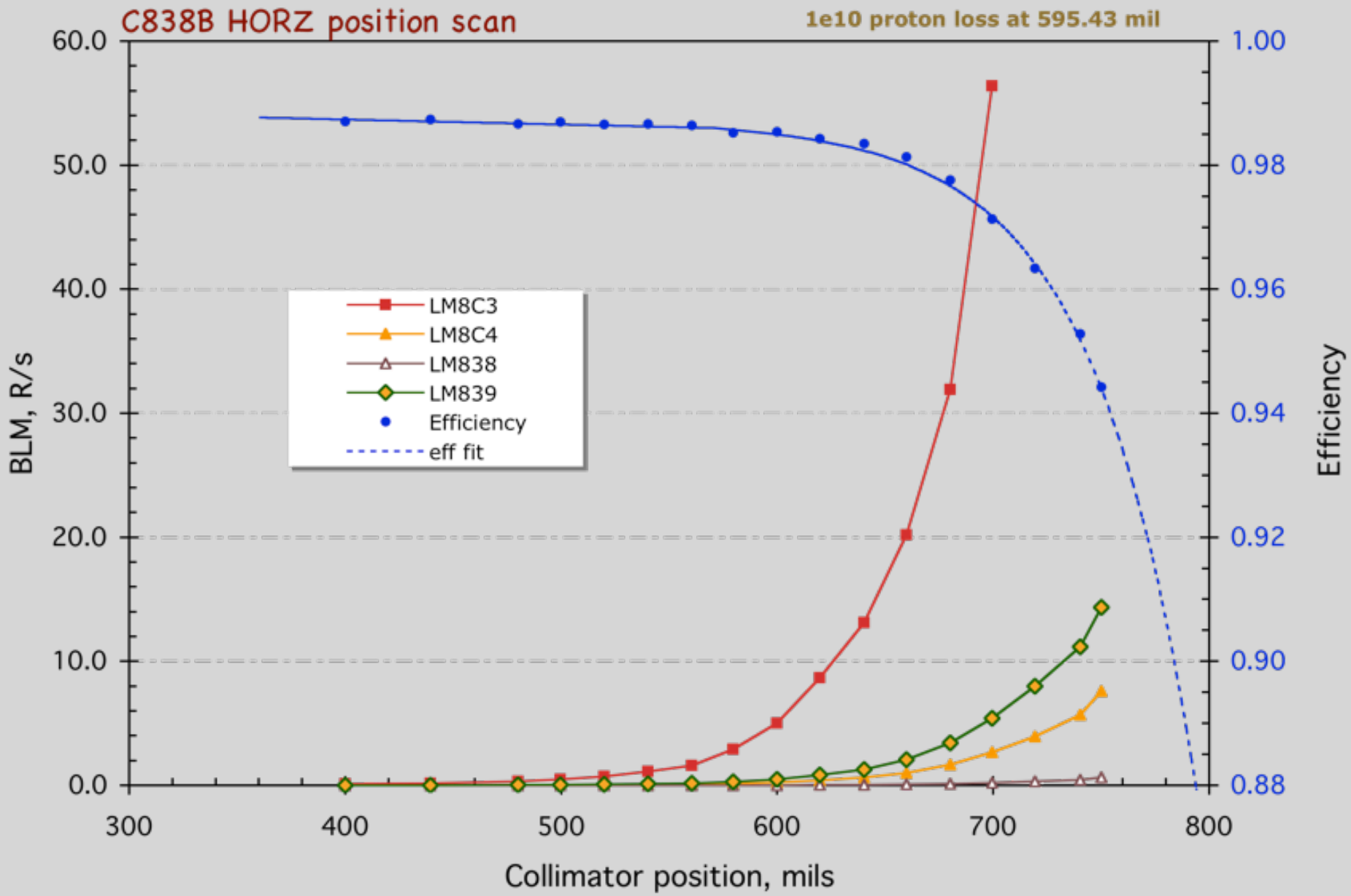
Swapped C838 horizontal edges

09/24/2010

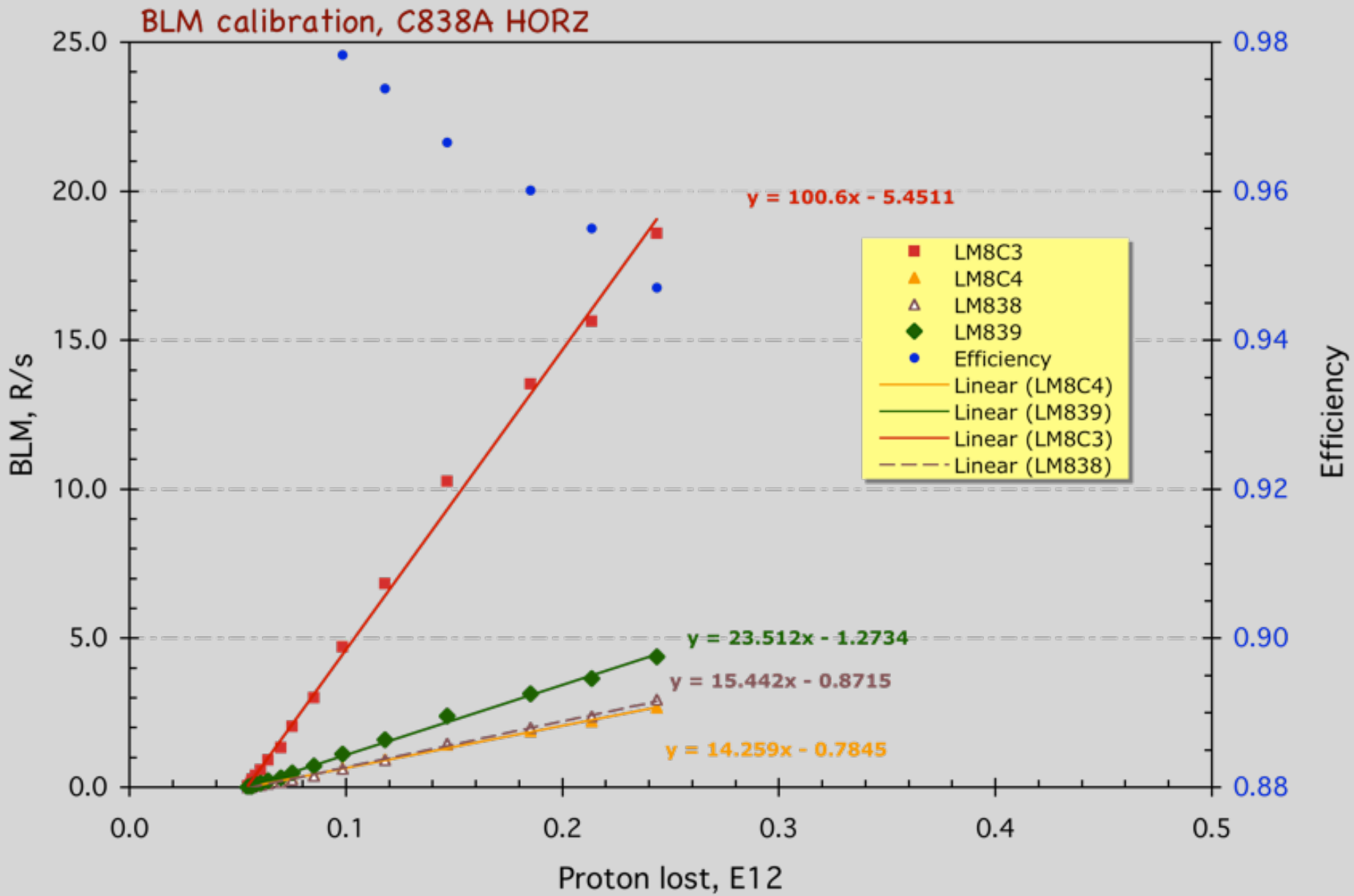
C838A horizontal scan, RIGHT edge



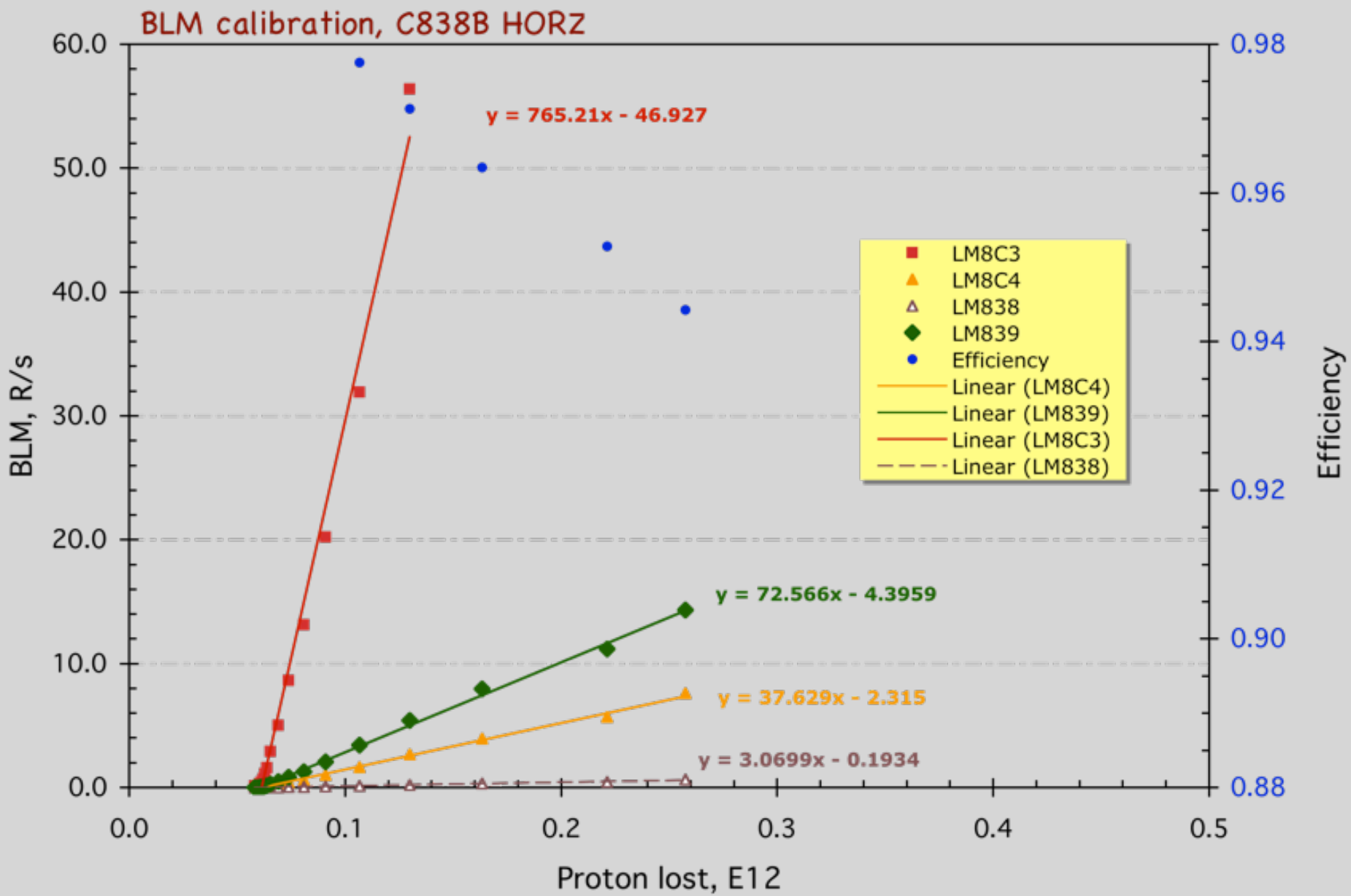
C838B horizontal scan, LEFT edge



BLM calibration, C838A RIGHT edge



BLM calibration, C838B LEFT edge



With opposing C838 horizontal edges

Response matrix, (R/S)/e12

	C836AH	C836AV	C836BH	C836BV	C838AH	C838AV	C838BH	C838BV
LM8C1/C3	85.063	128.18	548.44	398.25	143.24	106.07	228.43	342.17
LM8C2/C4	14.171	15.565	36.504	53.372	17.321	13.371	44.25	43.199
LM836/838	19.266	26.849	3.092	2.0157	9.6455	16.509	2.9031	2.778
LM837/839	16.386	38.548	118.57	80.307	80.097	46.581	37.112	43.199

Response matrix, (R/S)/e12

C838 collimating edges as that of C836

	C836AH	C836AV	C836BH	C836BV	C838AH	C838AV	C838BH	C838BV
LM8C1/C3	85.063	128.18	548.44	398.25	100.6	106.07	765.21	342.17
LM8C2/C4	14.171	15.565	36.504	53.372	14.259	13.371	37.629	43.199
LM836/838	19.266	26.849	3.092	2.0157	15.442	16.509	3.699	2.778
LM837/839	16.386	38.548	118.57	80.307	23.512	46.581	37.629	43.199