

# Optics Status Update

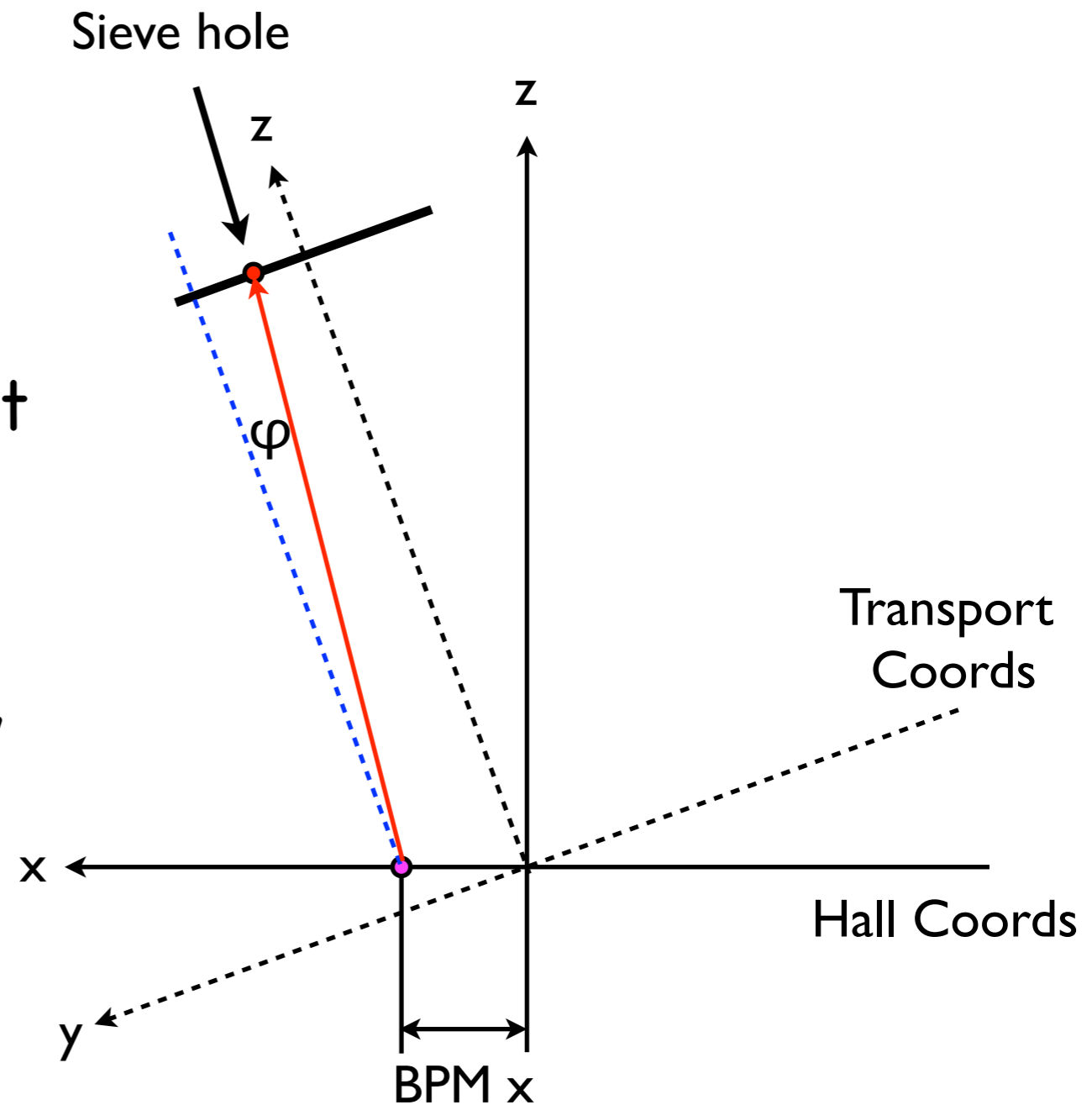
Chao Gu

# Optics Status

- Problem:
  - Large horizontal offset between 2 sets of straight-through optics data
  - Possibly caused by wrong beam position
- Solution:
  - Try not to rely on BPM at this moment
  - Directly use focus plane variables to reconstruct  $\phi$

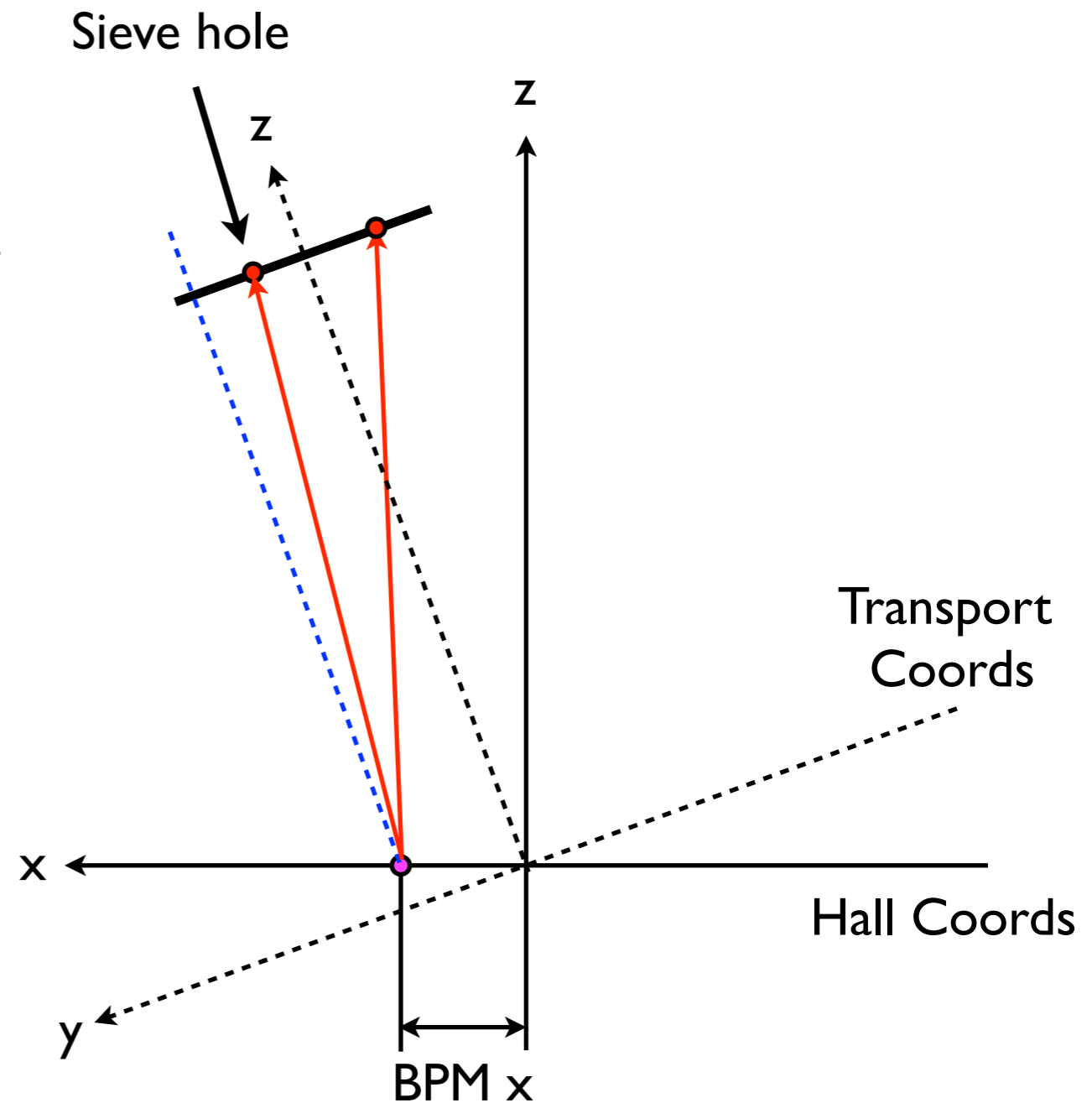
# Optics Status

- Optimizer update:
- Rewrite the target phi part with a new algorithm
- Previous method: use BPM info and sieve hole's survey data as reference to do a fit



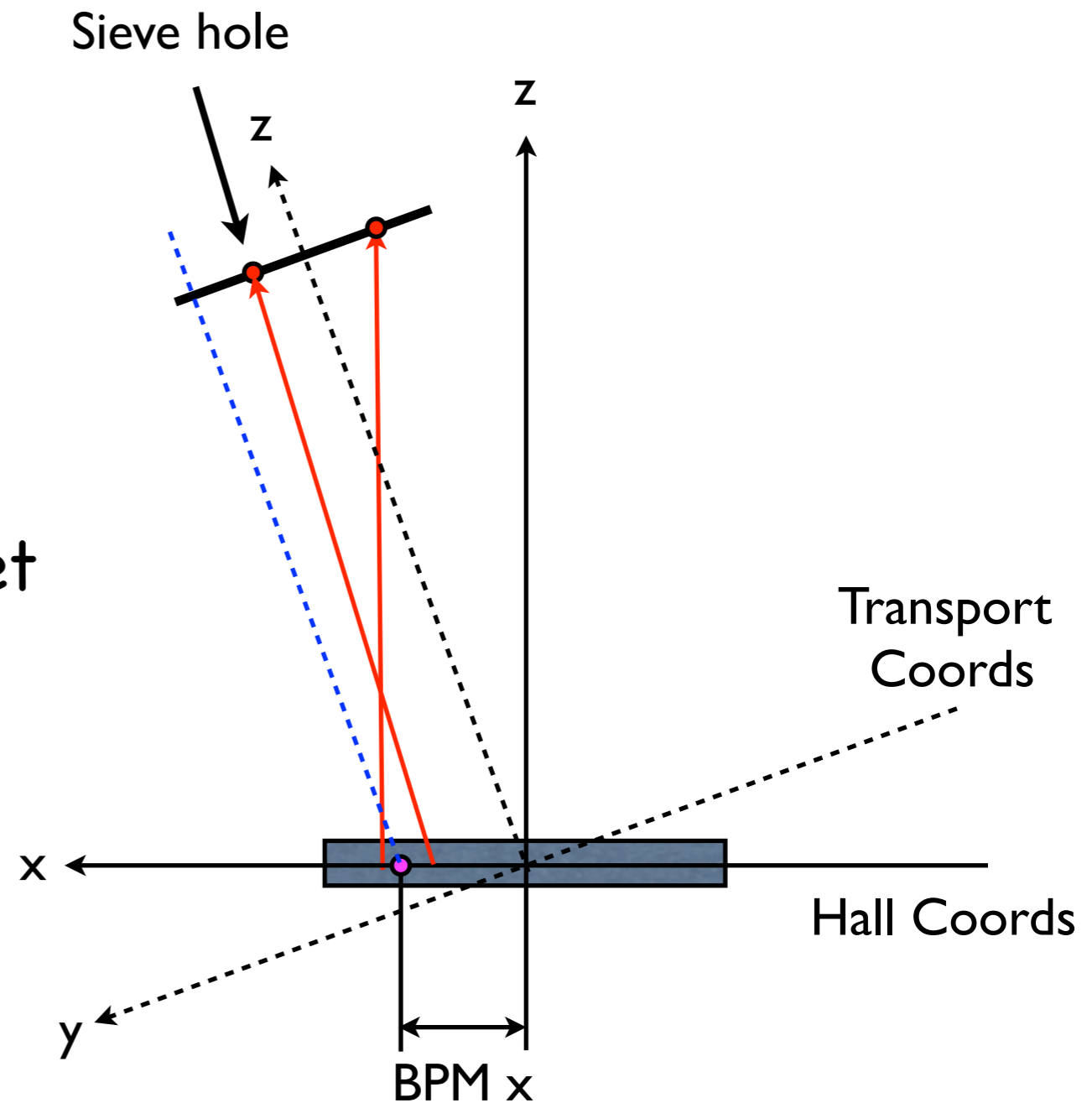
# Optics Status

- New method:
- Assume the beam hits only one point on the target
- No raster
- Foil target
- Ideally the reconstructed trajectories should intersect at this target point

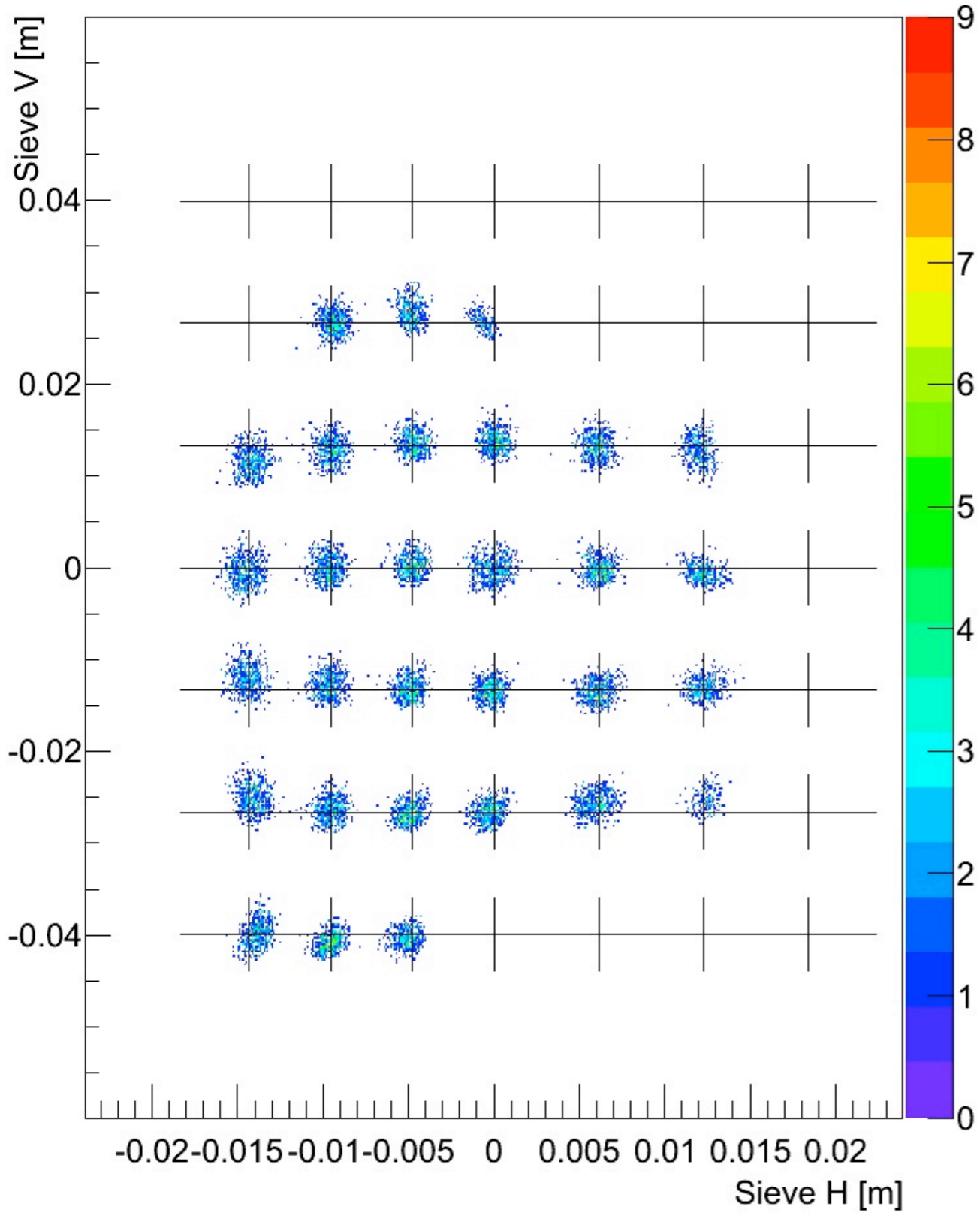


# Optics Status

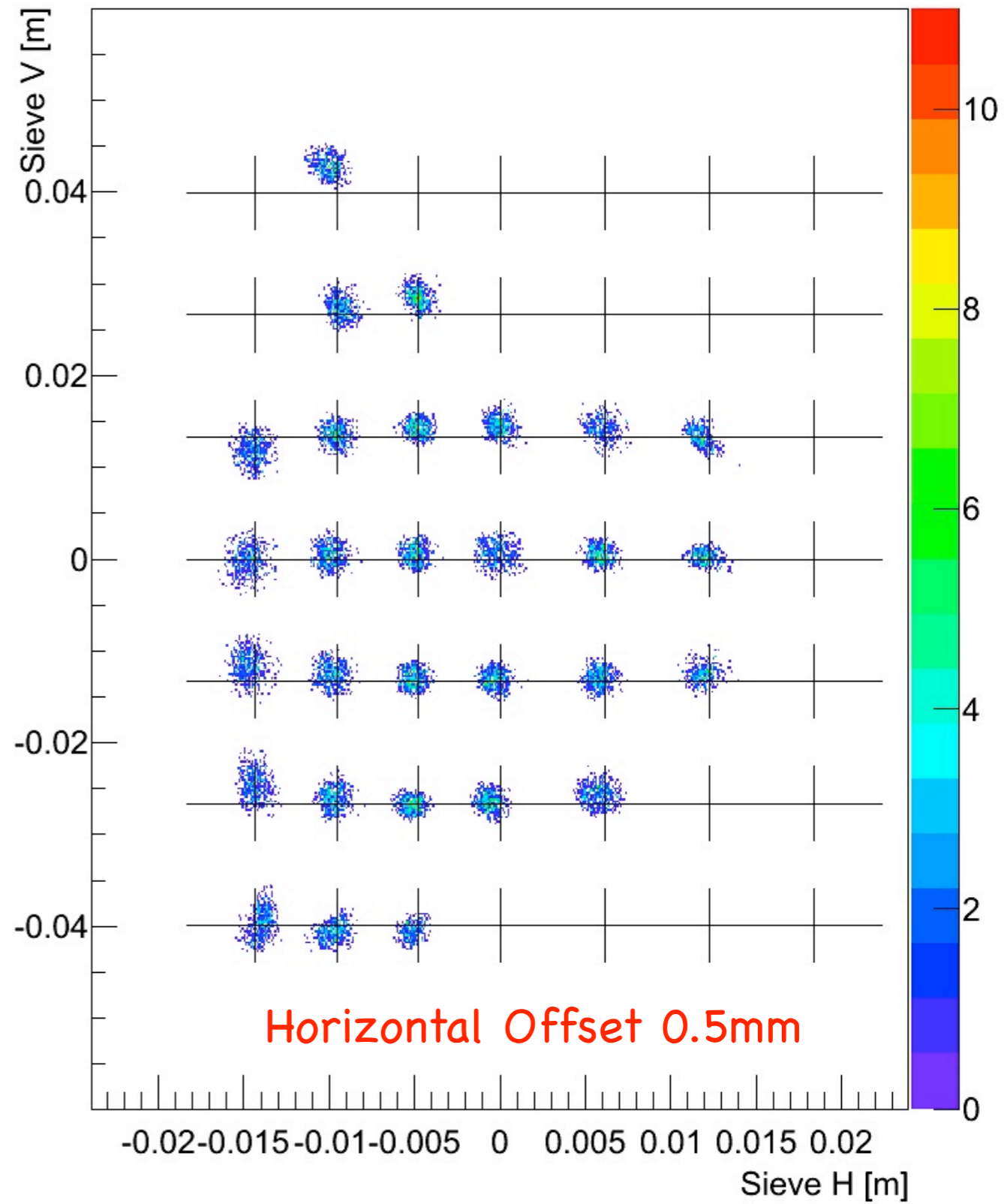
- New method:
- Actually it will not perfectly intersect
- Each trajectory has an intersection with the target foil
- The standard deviation of these intersections will give us a reference to do the fit



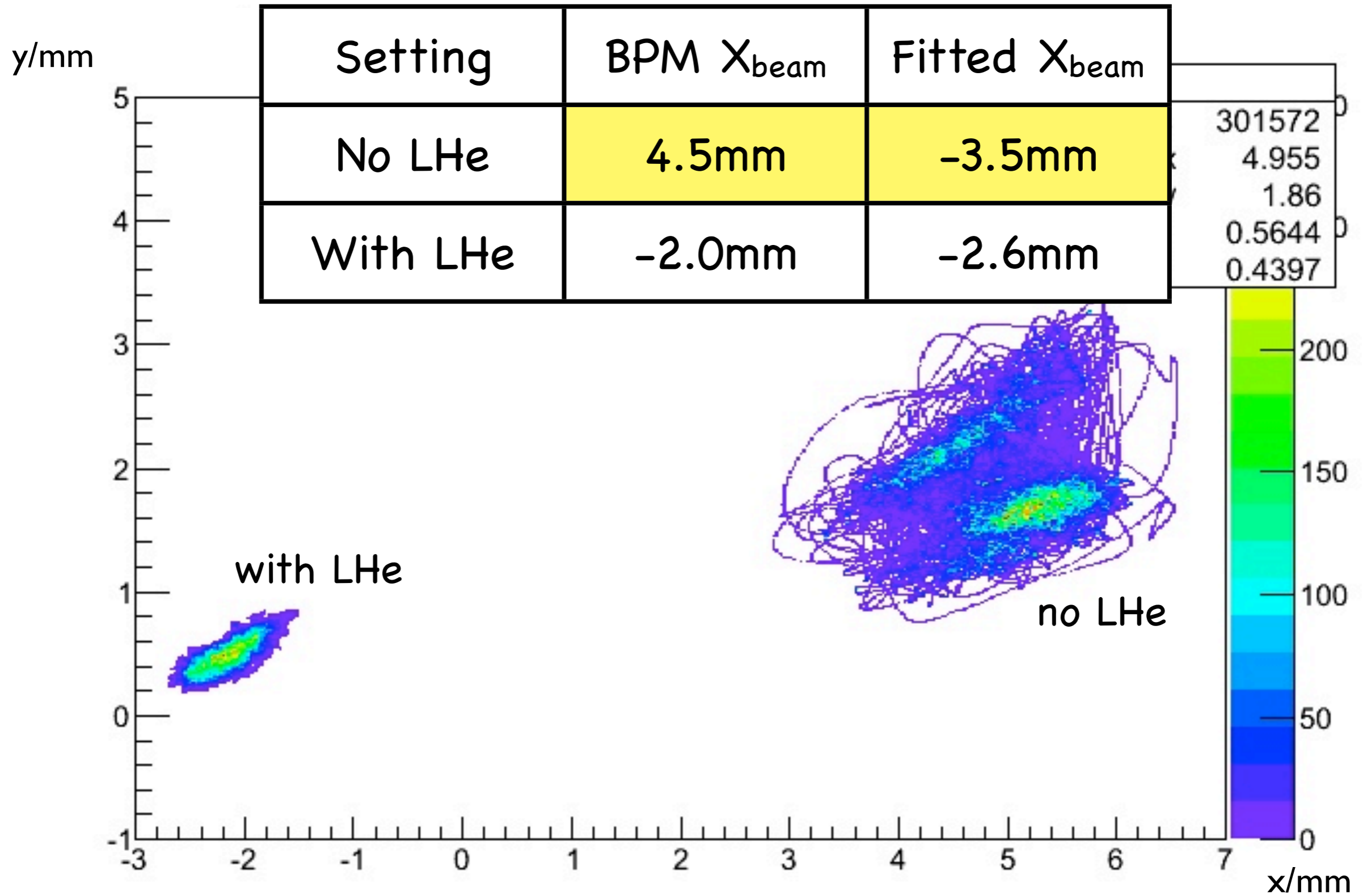
calibration using up to 2nd order matrix elements (no LHe setting)



Use this database to plot With-LHe data



# Fitting result



# 1st Order

- Only show 1st order matrix elements here

$$\theta_{tg} = T_{0000} + T_{1000} x + T_{0100} \theta + T_{0010} y + T_{0001} \varphi$$

$$\varphi_{tg} = P_{0000} + P_{1000} x + P_{0100} \theta + P_{0010} y + P_{0001} \varphi$$

	T <sub>0000</sub>	T <sub>1000</sub>	T <sub>0100</sub>	T <sub>0010</sub>	T <sub>0001</sub>
No LHe	1.723E-03	2.600E-02	-2.811E+00	-3.656E-02	6.740E-02
With LHe	1.025E-03	2.560E-02	-2.804E+00	-7.711E-02	1.557E-01
	P <sub>0000</sub>	P <sub>1000</sub>	P <sub>0100</sub>	P <sub>0010</sub>	P <sub>0001</sub>
No LHe	-1.553E-04	2.271E-03	-2.170E-02	-8.461E-01	6.838E-01
With LHe	-1.435E-04	1.705E-03	-4.671E-04	-8.890E-01	7.662E-01



## Use fitted beam position

	$T_{0000}$	$T_{1000}$	$T_{0100}$	$T_{0010}$	$T_{0001}$
No LHe	1.723E-03	2.600E-02	-2.811E+00	-3.656E-02	6.740E-02
With LHe	1.025E-03	2.560E-02	-2.804E+00	-7.711E-02	1.557E-01
	$P_{0000}$	$P_{1000}$	$P_{0100}$	$P_{0010}$	$P_{0001}$
No LHe	-1.553E-04	2.271E-03	-2.170E-02	-8.461E-01	6.838E-01
With LHe	-1.435E-04	1.705E-03	-4.671E-04	-8.890E-01	7.662E-01

## Use BPM beam position

	$T_{0000}$	$T_{1000}$	$T_{0100}$	$T_{0010}$	$T_{0001}$
No LHe	1.726E-03	2.603E-02	-2.814E+00	-3.663E-02	6.747E-02
With LHe	1.024E-03	2.560E-02	-2.804E+00	-7.711E-02	1.558E-01
	$P_{0000}$	$P_{1000}$	$P_{0100}$	$P_{0010}$	$P_{0001}$
No LHe	-1.013E-02	2.170E-03	-2.008E-02	-8.482E-01	6.873E-01
With LHe	-1.578E-03	-7.523E-04	5.409E-03	-8.906E-01	7.672E-01

# Optics Status

- TODO:
  - Combine the  $y_{tg}$  calibration result