

Report on the McStas simulations of the HYSPEC guides and focusing crystals

June 2006

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**REPORT ON THE MCSTAS SIMULATIONS
OF THE HYSPEC GUIDES AND FOCUSING CRYSTALS**

M.E HAGEN

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OAK RIDGE NATIONAL LABORATORY
P.O. Box 2008
Oak Ridge, Tennessee 37831-6285
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of the HYSPEC guides and focusing crystals**

1st June 2006

Mark Hagen
Instrument Scientist, HYSPEC

Date

William Leonhardt
Instrument Engineer, HYSPEC

Date

John Haines
SING MIE Project Manager

Date

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Introduction

This

Engineering layout of the beamline

The.

The dimensions of the focusing crystals

The

The dimensions of the crystals and gaps

The case.

IN20 configuration of crystals

The out.

IN22 configuration of crystals

The required.



Figure 1: The SwissNeutronics double focusing monochromator constructed for E₂ at HMI.

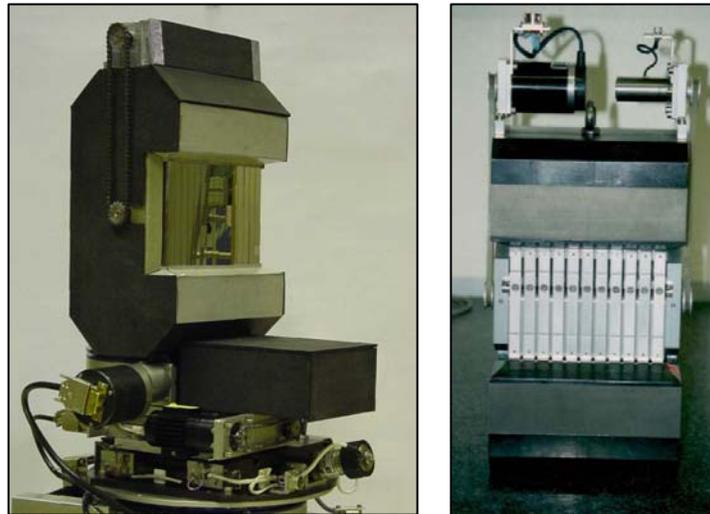


Figure 2: The IN20 style Heusler monochromator with vertically oriented Heusler crystals

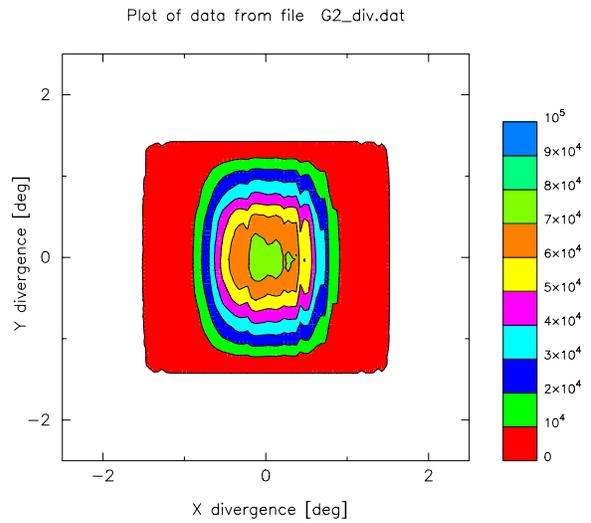
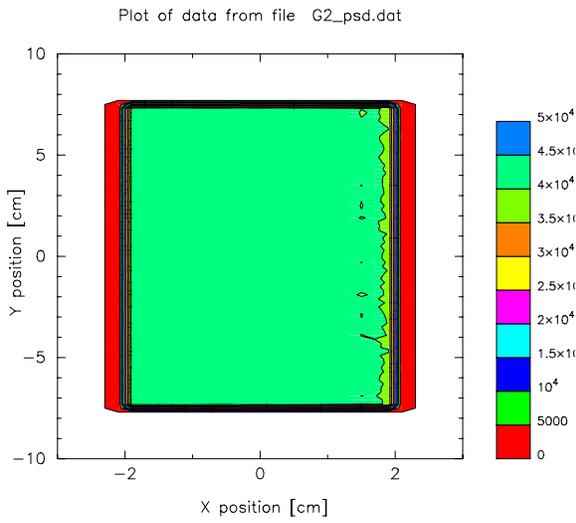


Figure 3: The IN22 style Heusler monochromator with horizontally oriented Heusler crystals.

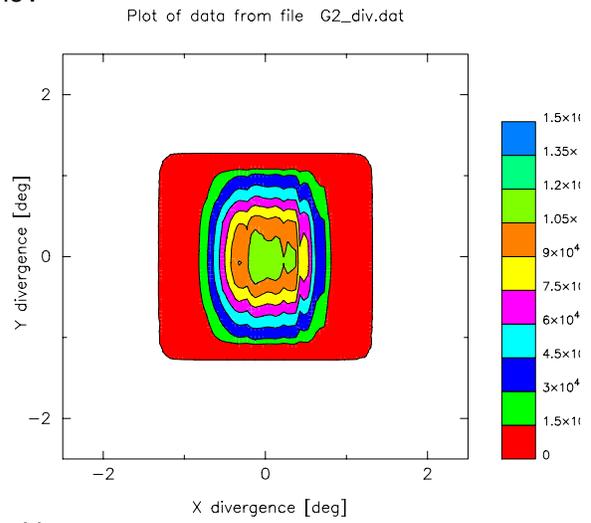
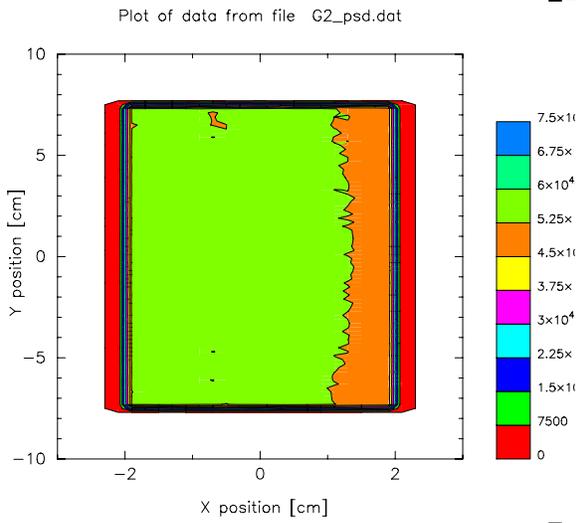
Case 6

The first model examined

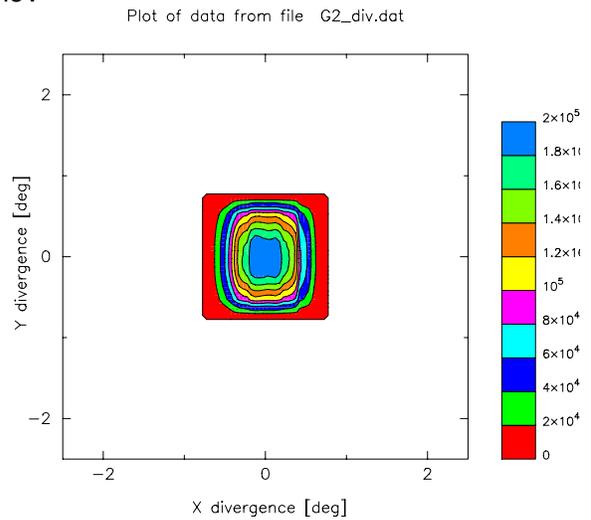
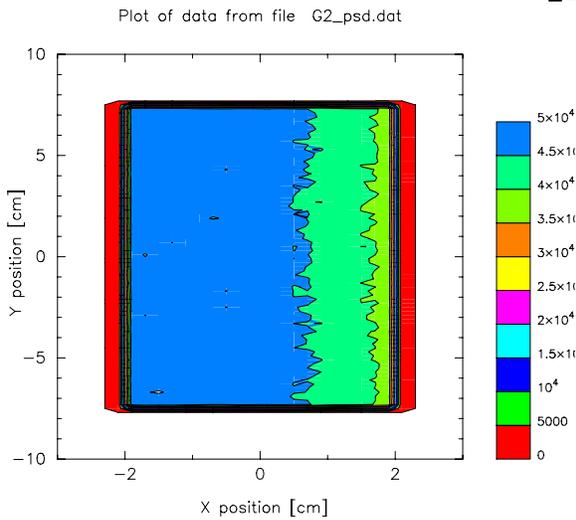
Layout up to G4	As in engineering layout
G4	Length = 1.7m (ends 0.3m inside drum shield), m=3 on all surfaces, guides is straight 150mm tall x 40mm wide
Guide coatings	All m=3 including inner surface of curved guide
T2 chopper frequency	180Hz
Focusing crystals	HOPG – ZYB (48') 13 x 13 array of strips 19mm wide x 12mm tall with 1mm gap between strips. Total width = 260mm, height = 168mm. Vertically focused on sample LMM=Infinity, LMS=1.4m



E=3.6meV



E=5.0meV



E=15meV

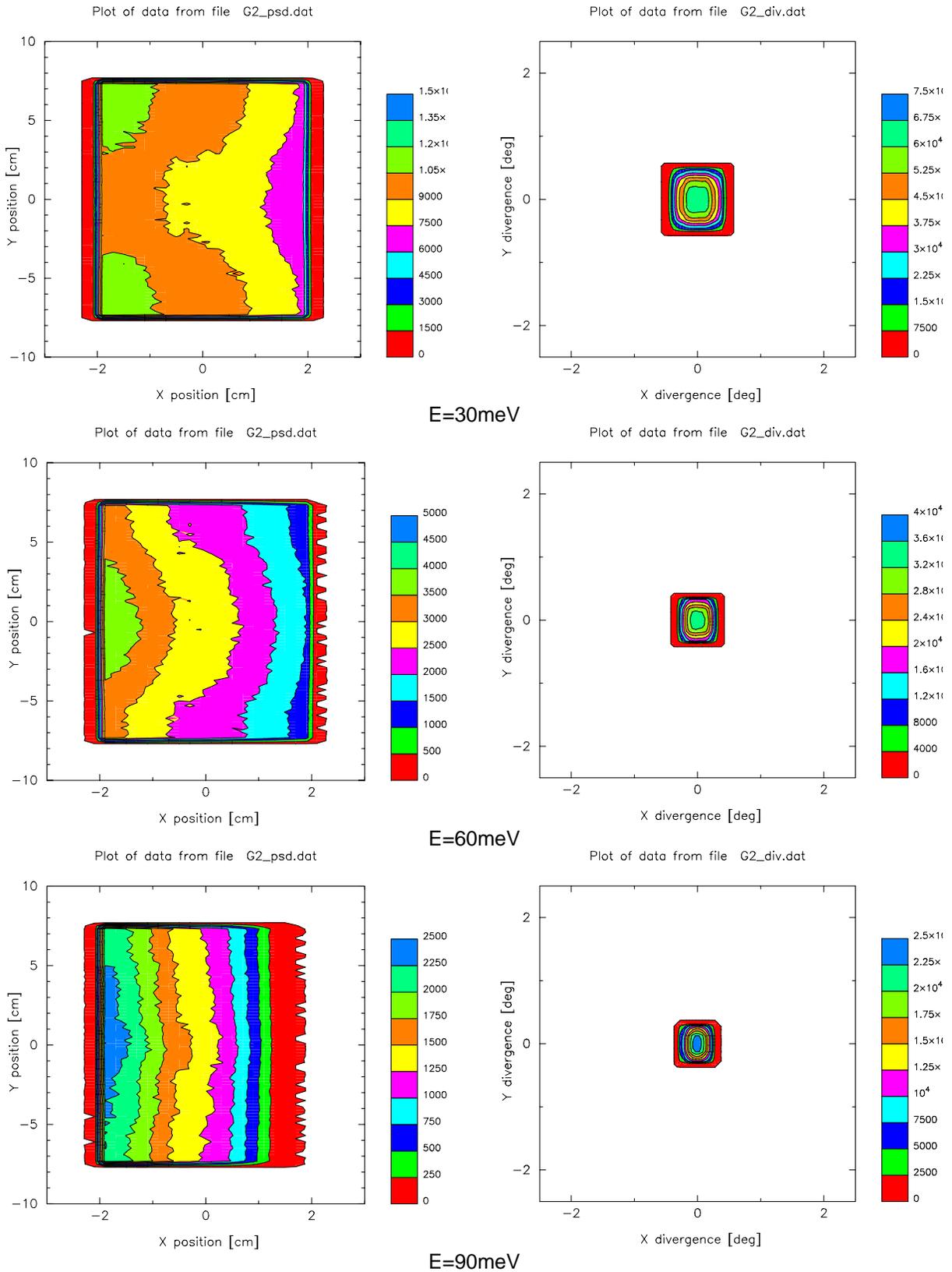
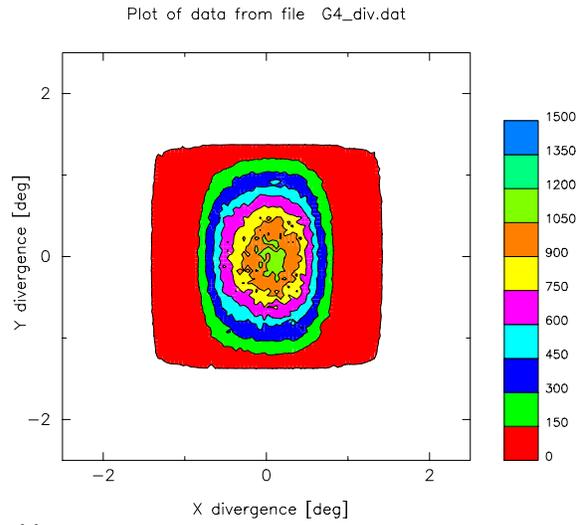
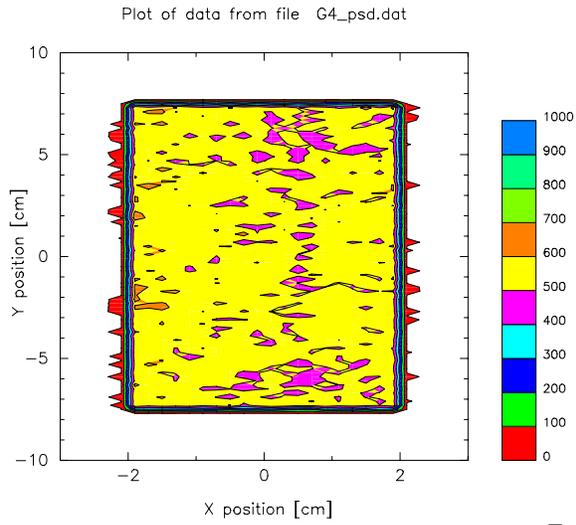
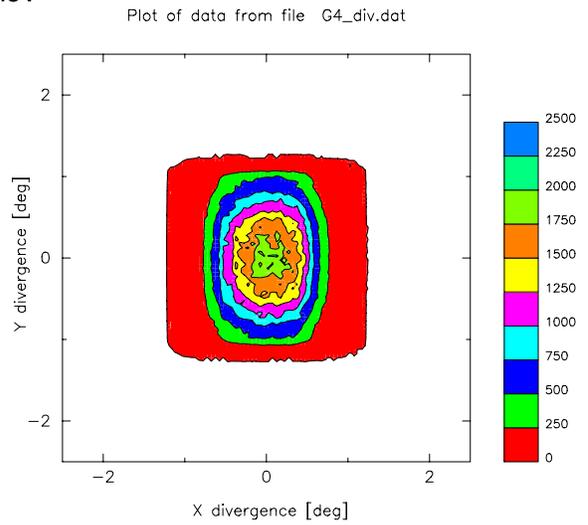
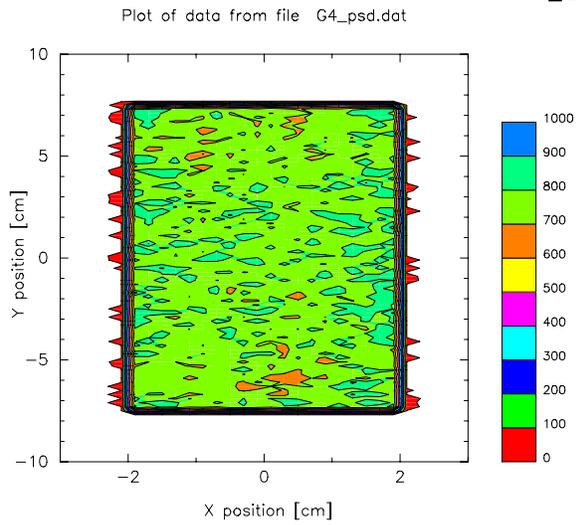


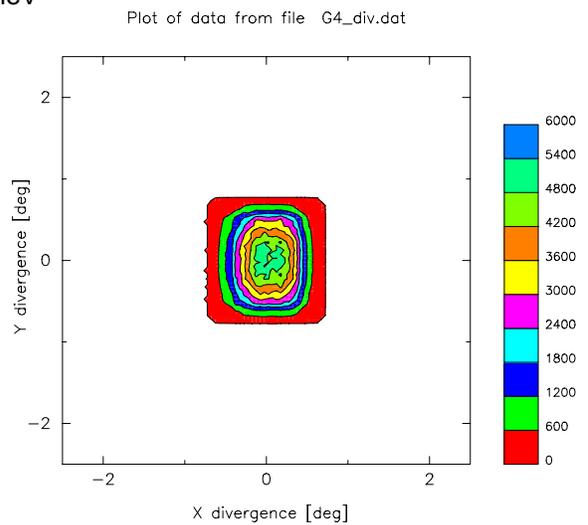
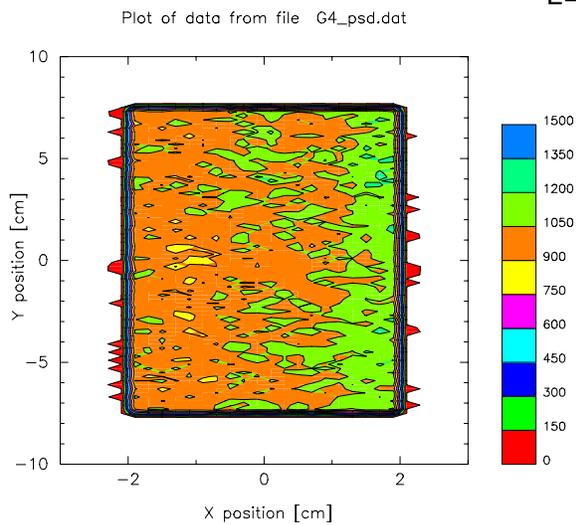
Figure 4: Spatial (left) and divergence (right) distributions after the curved guide G2 for case 6.



E=3.6meV



E=5.0meV



E=15meV

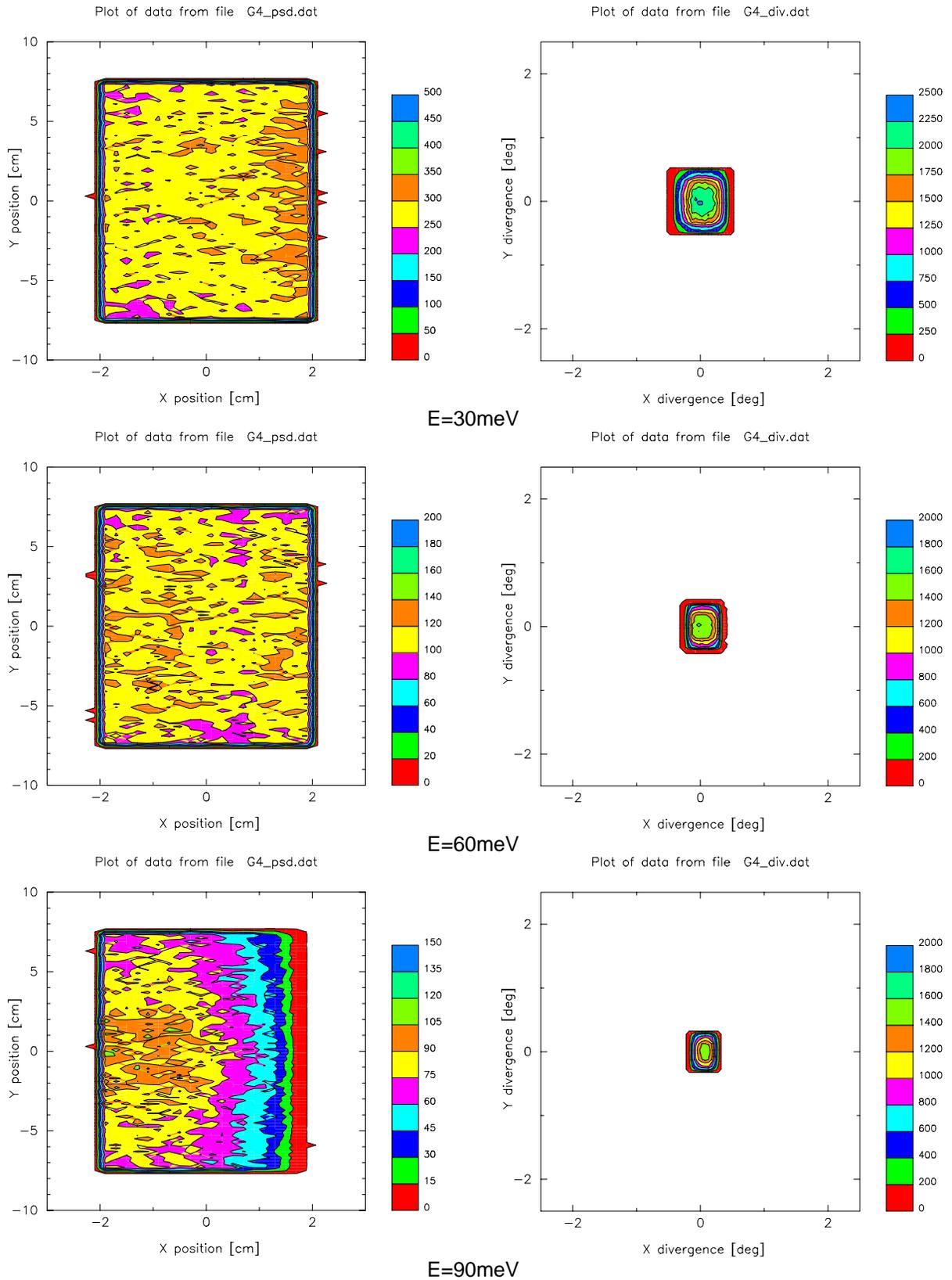
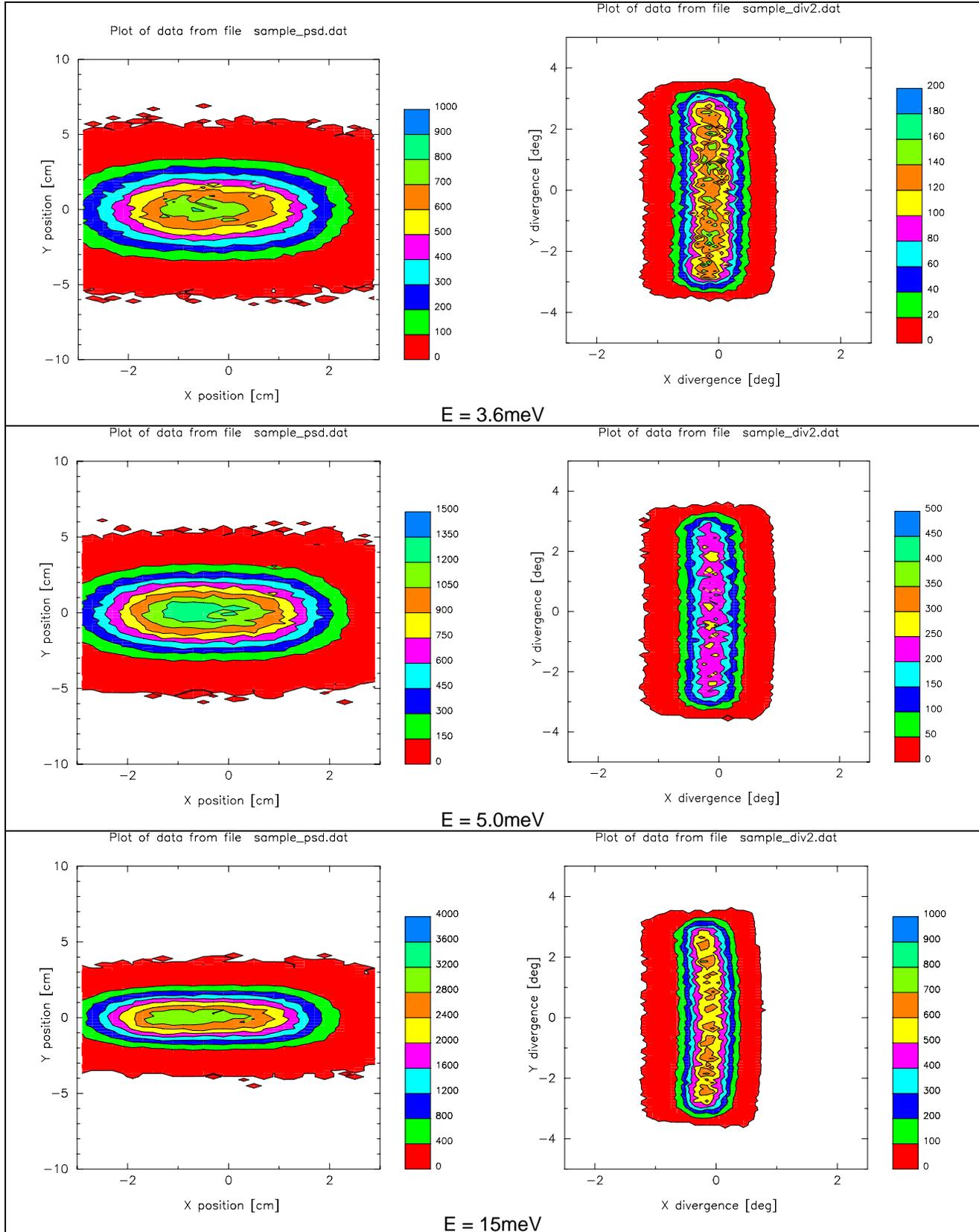


Figure 5: Spatial (left) and divergence (right) distributions after the straight guide G4 for case 6.



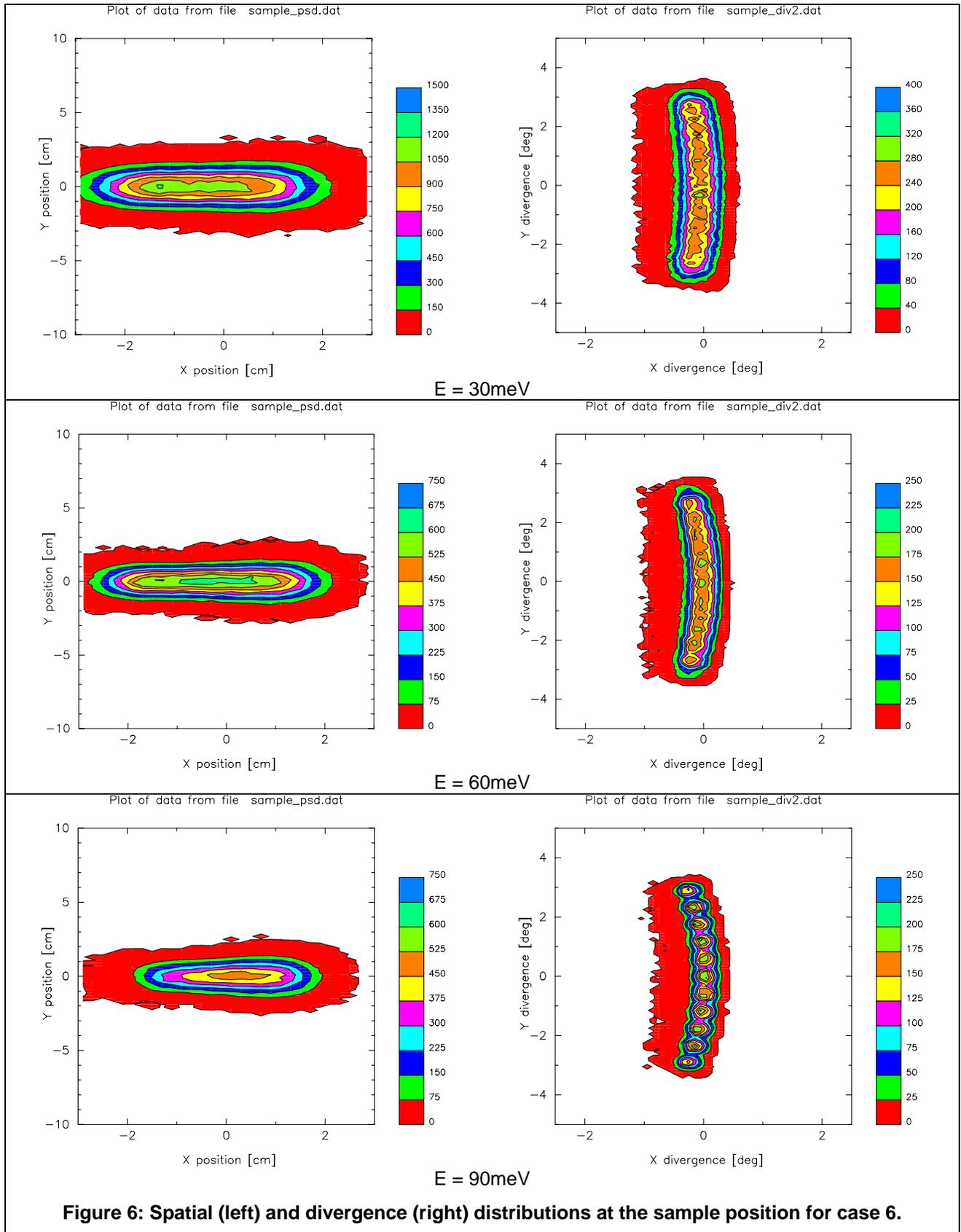


Figure 6: Spatial (left) and divergence (right) distributions at the sample position for case 6.

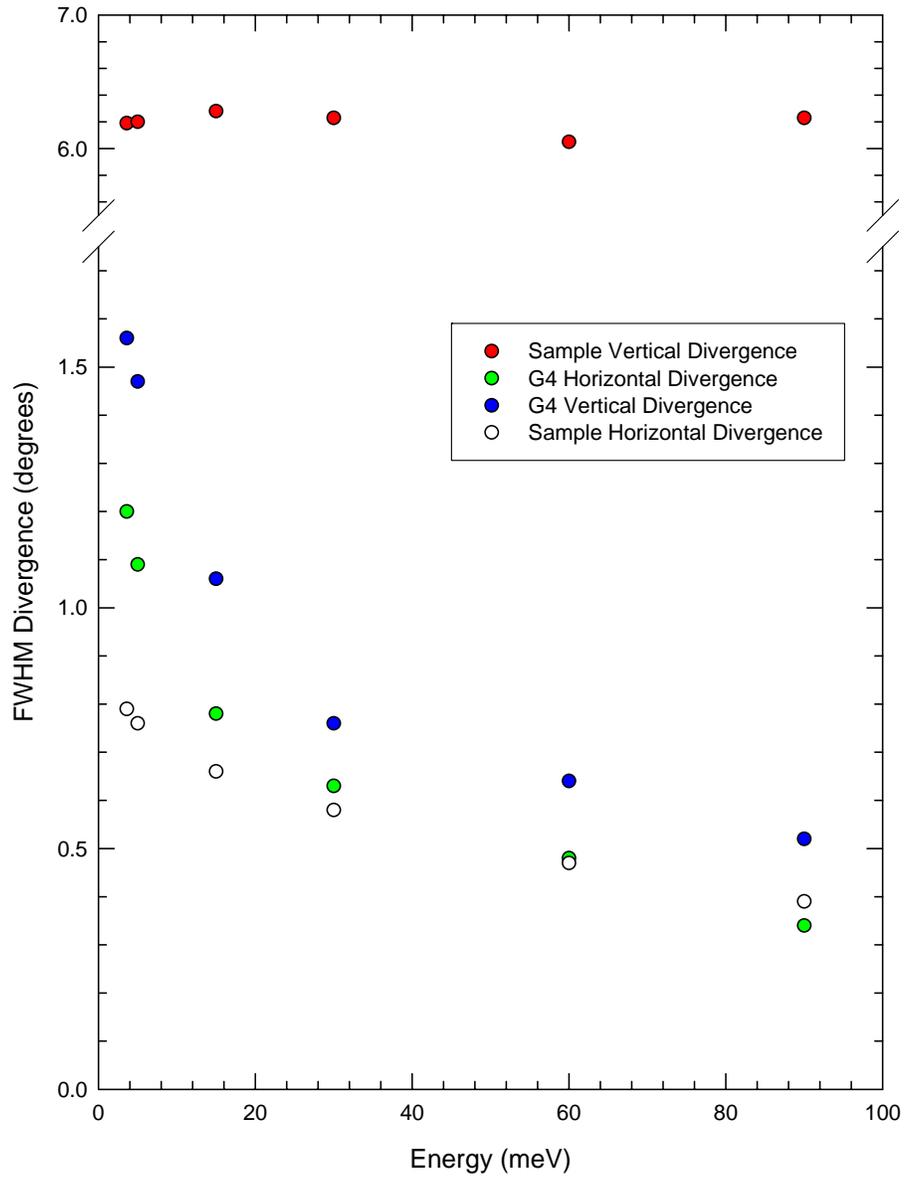


Figure 7: Divergences for case 6

Horizontal focusing

The out.

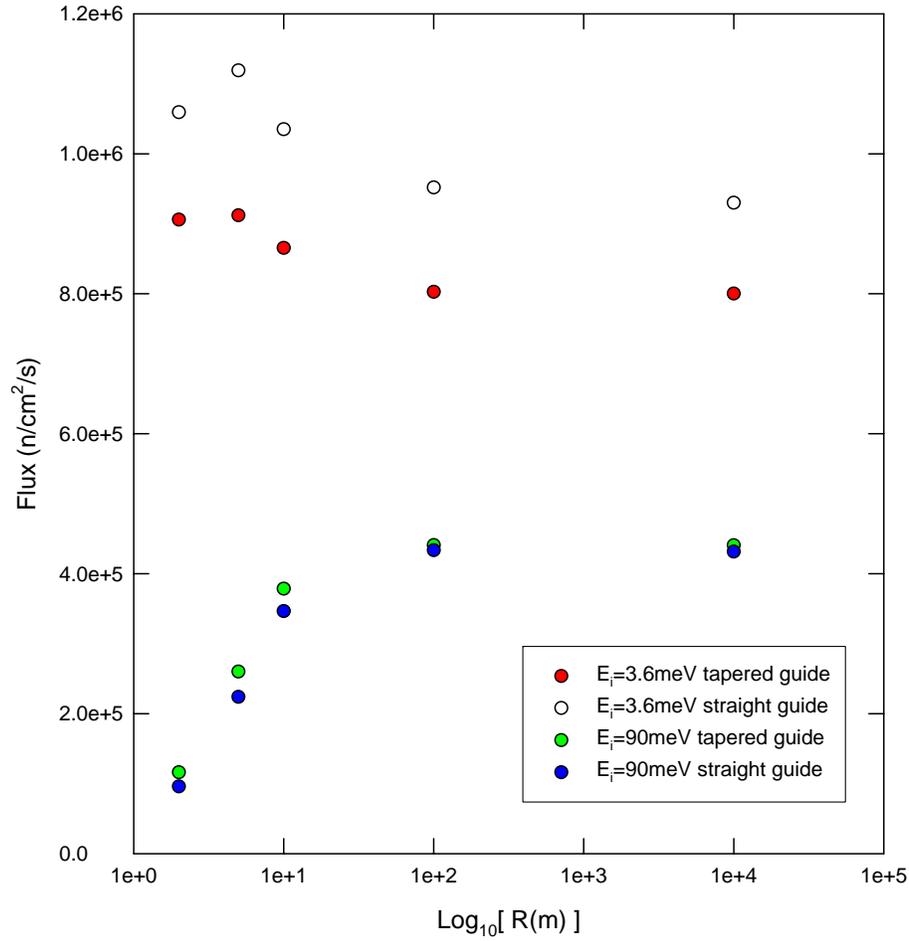


Figure 8: Finding the optimum radius of curvature for horizontal focusing at 3.6 and 90 meV for case ?.

Effect of guide tapering

The required.

Guide coating on curved section

The case.

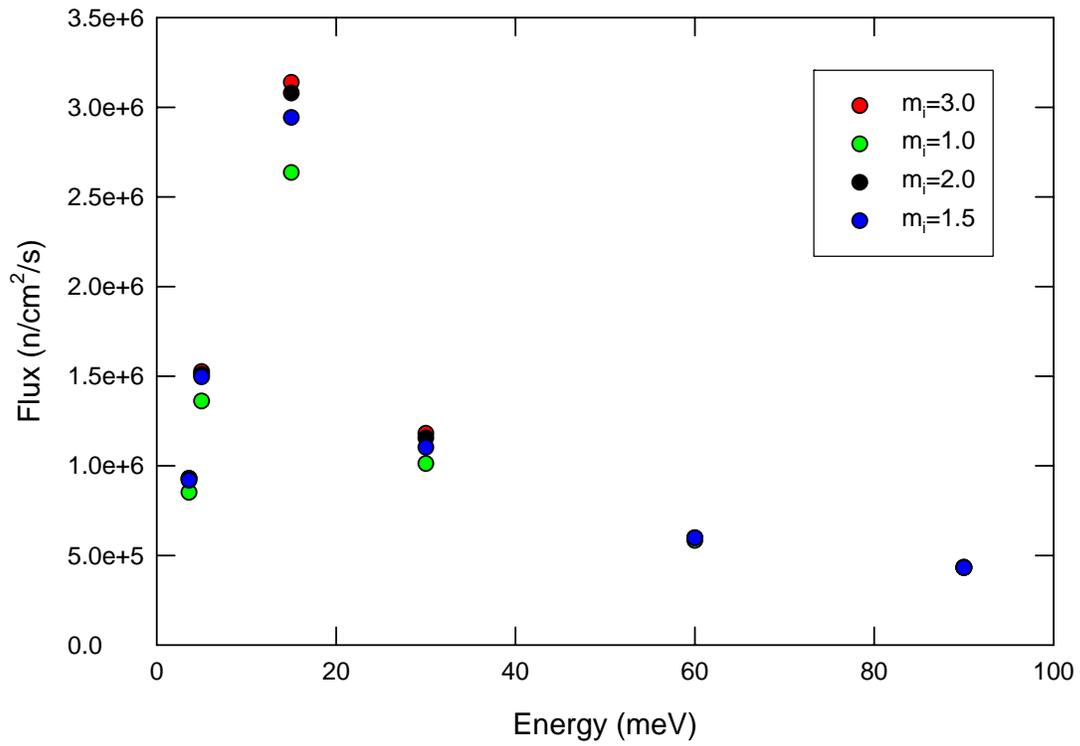


Figure 9: Comparison of flux at sample for different inner curved guide coatings.

Length of final guide section

The out.

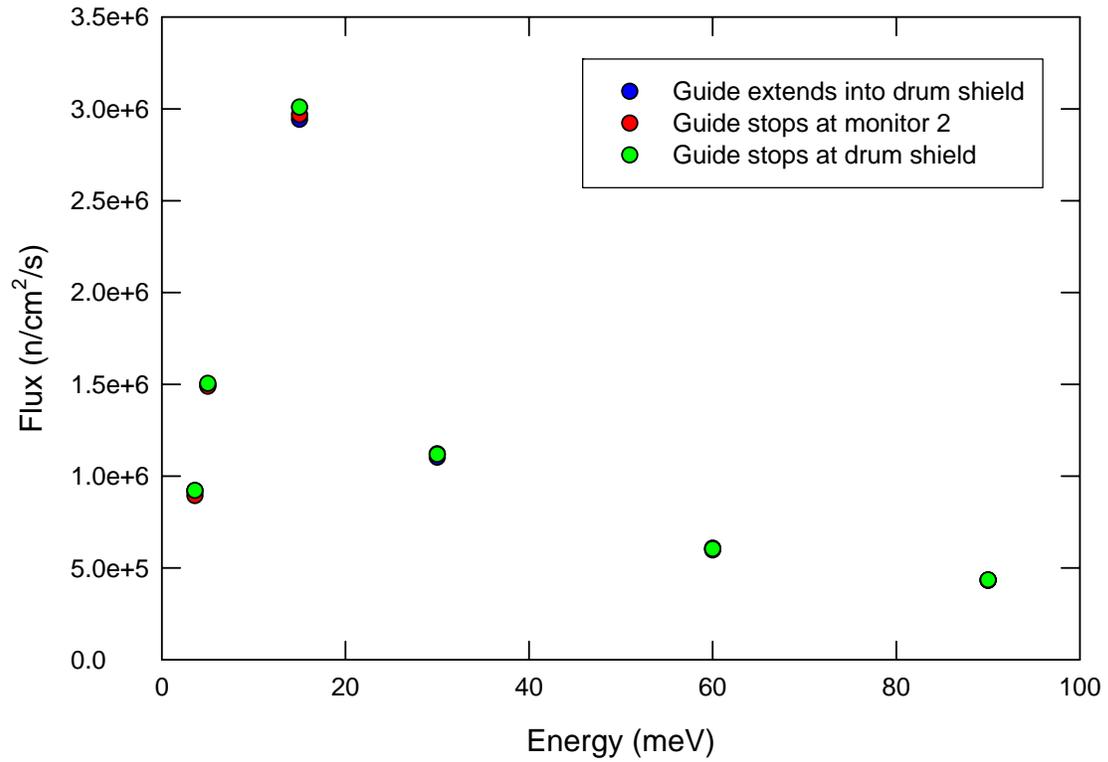


Figure 10: Comparison of flux at sample for different lengths of the final piece of guide.

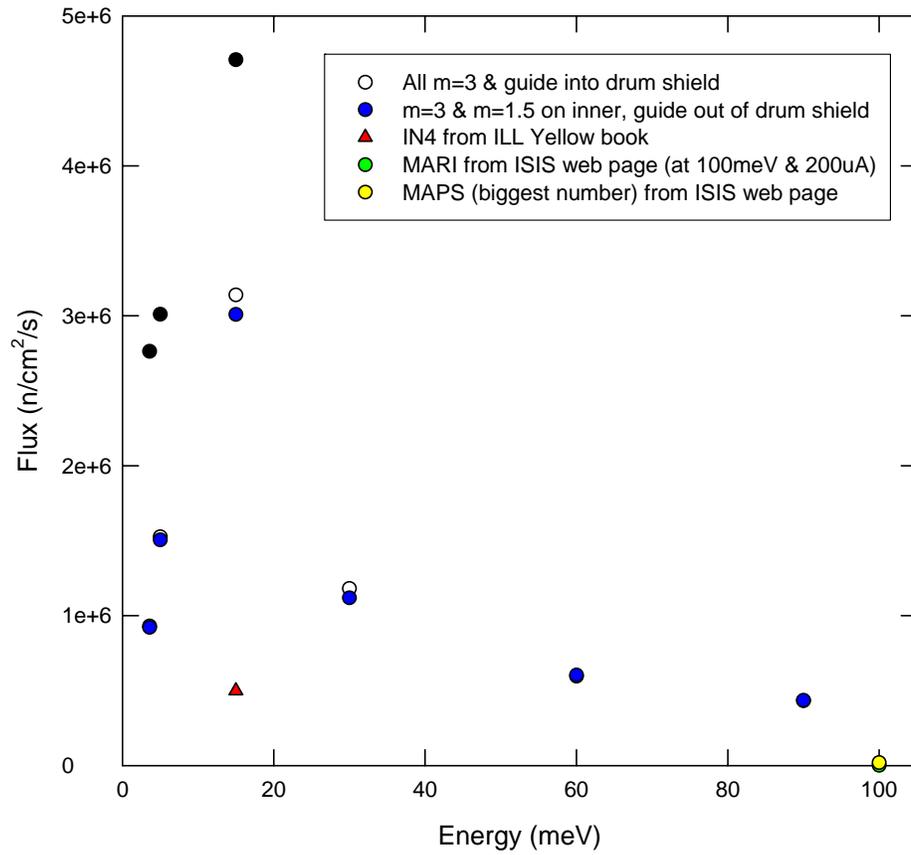
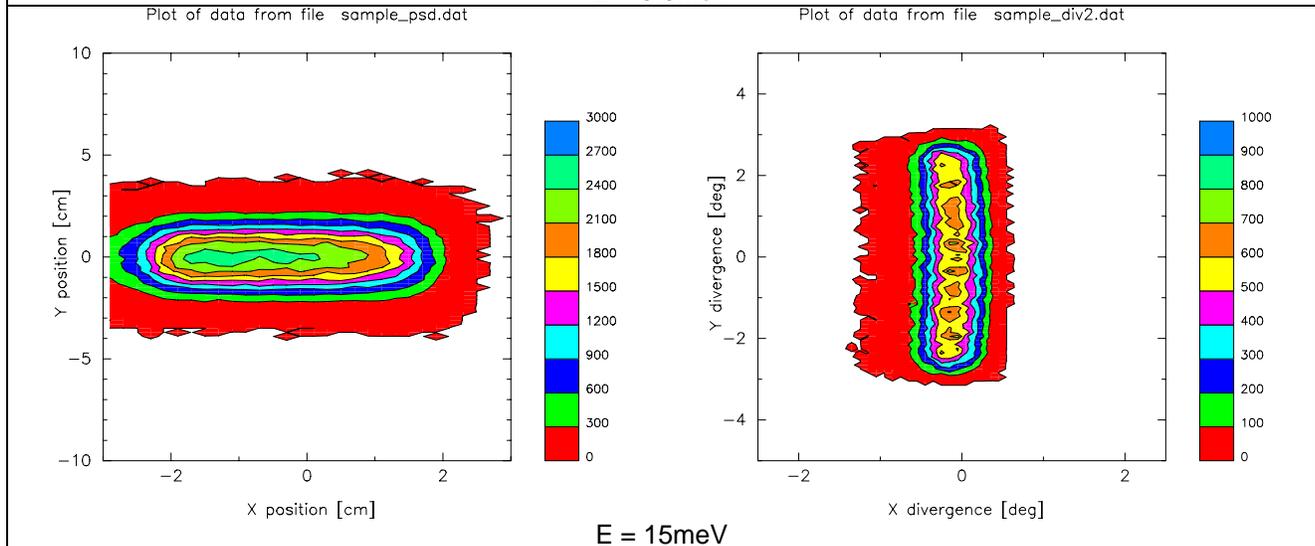
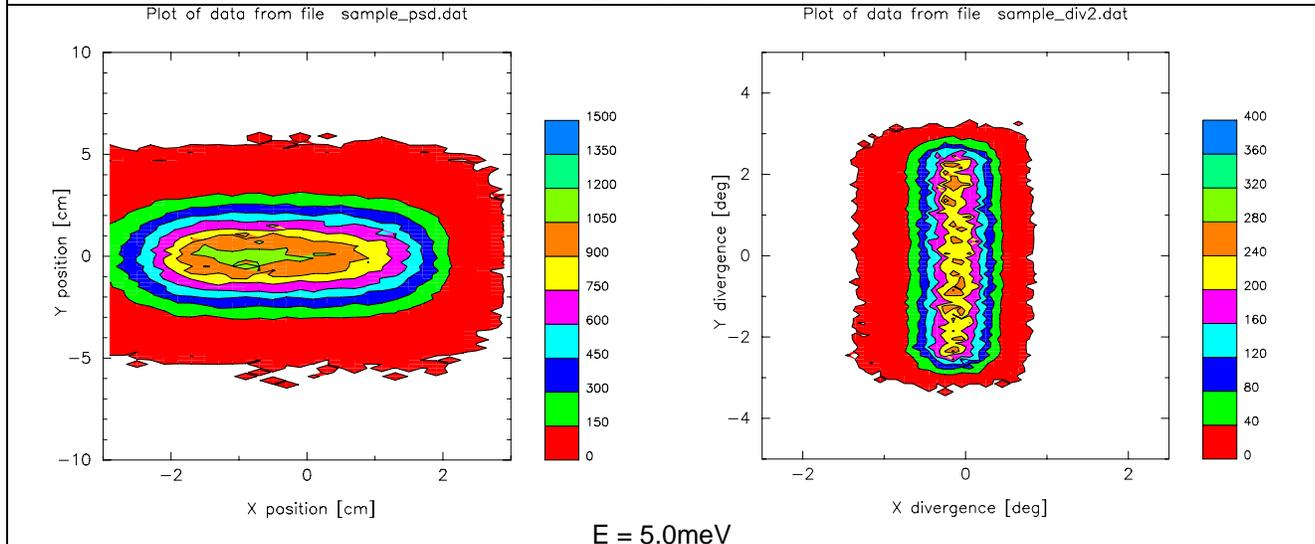
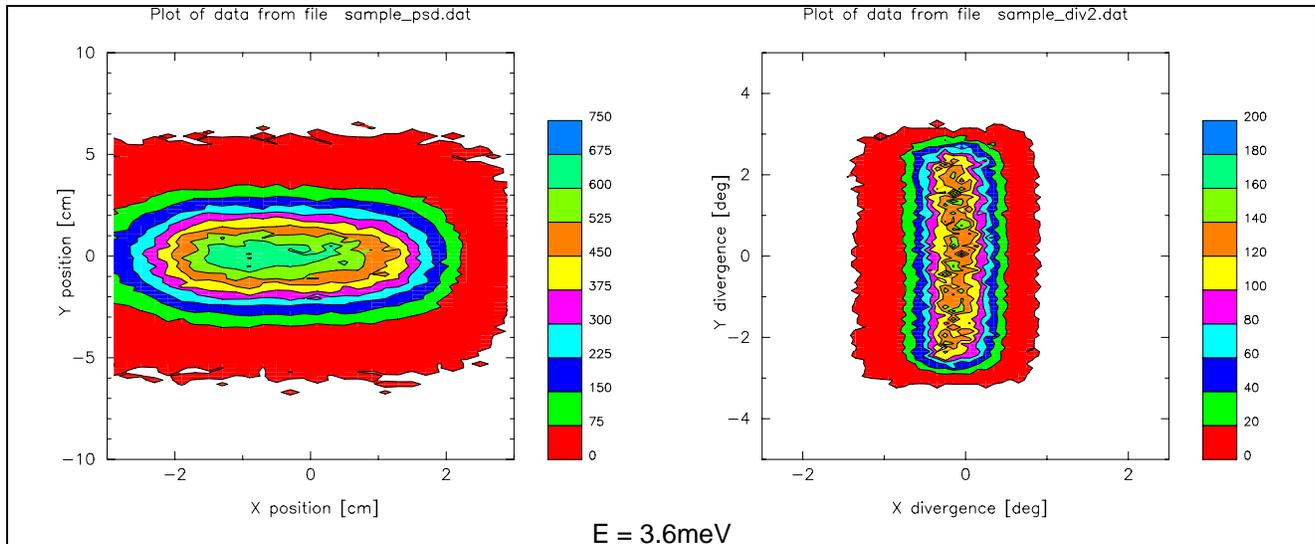
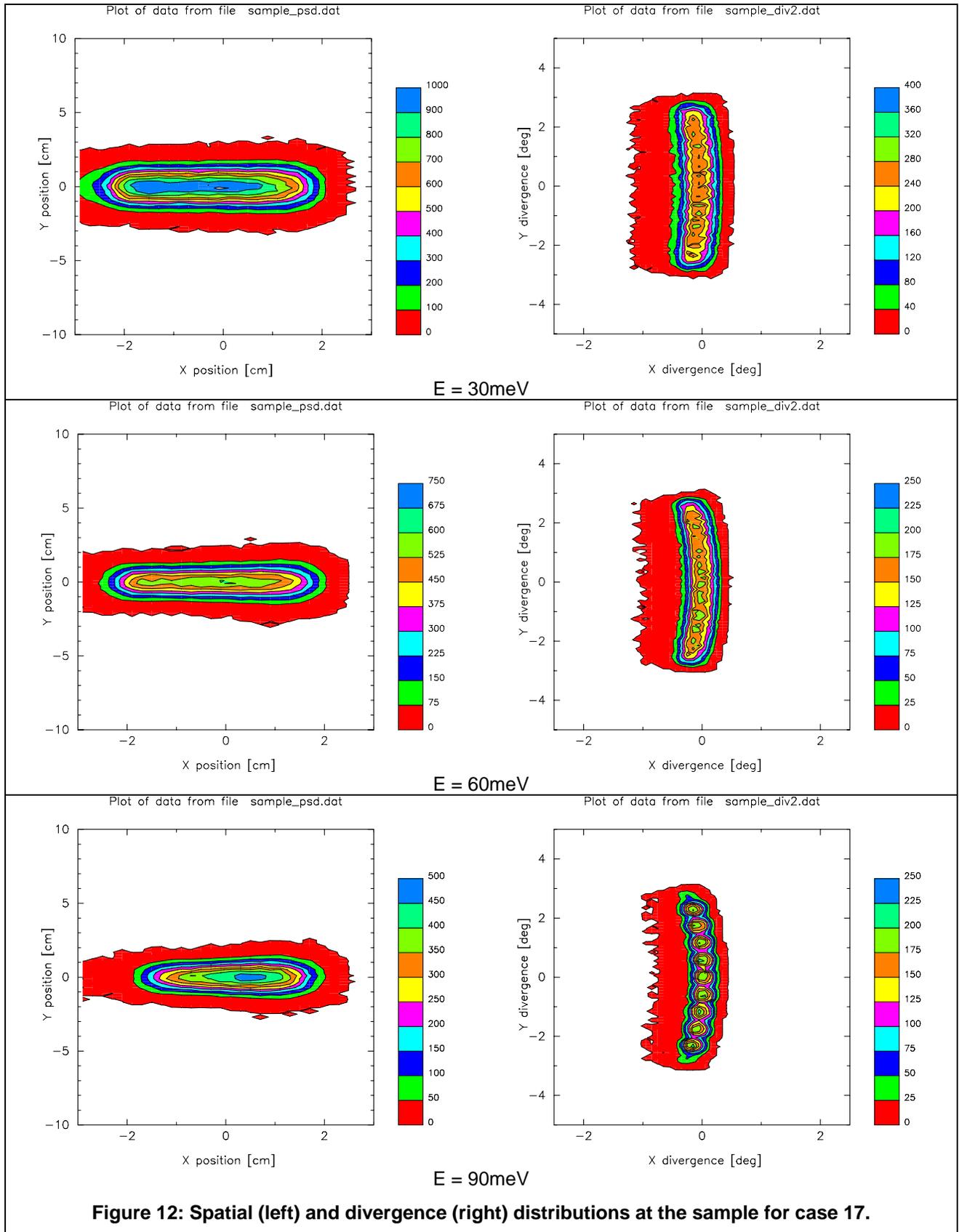


Figure 11: Flux at sample against energy comparison.





Comparison of ZYB and ZYA

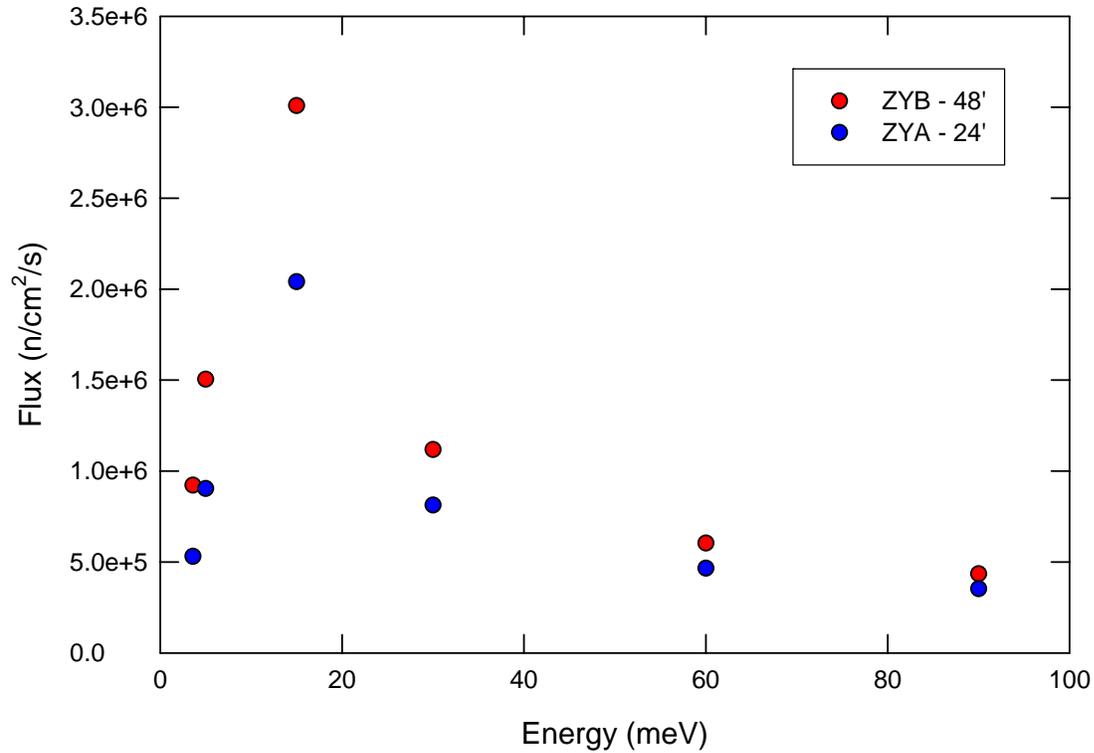
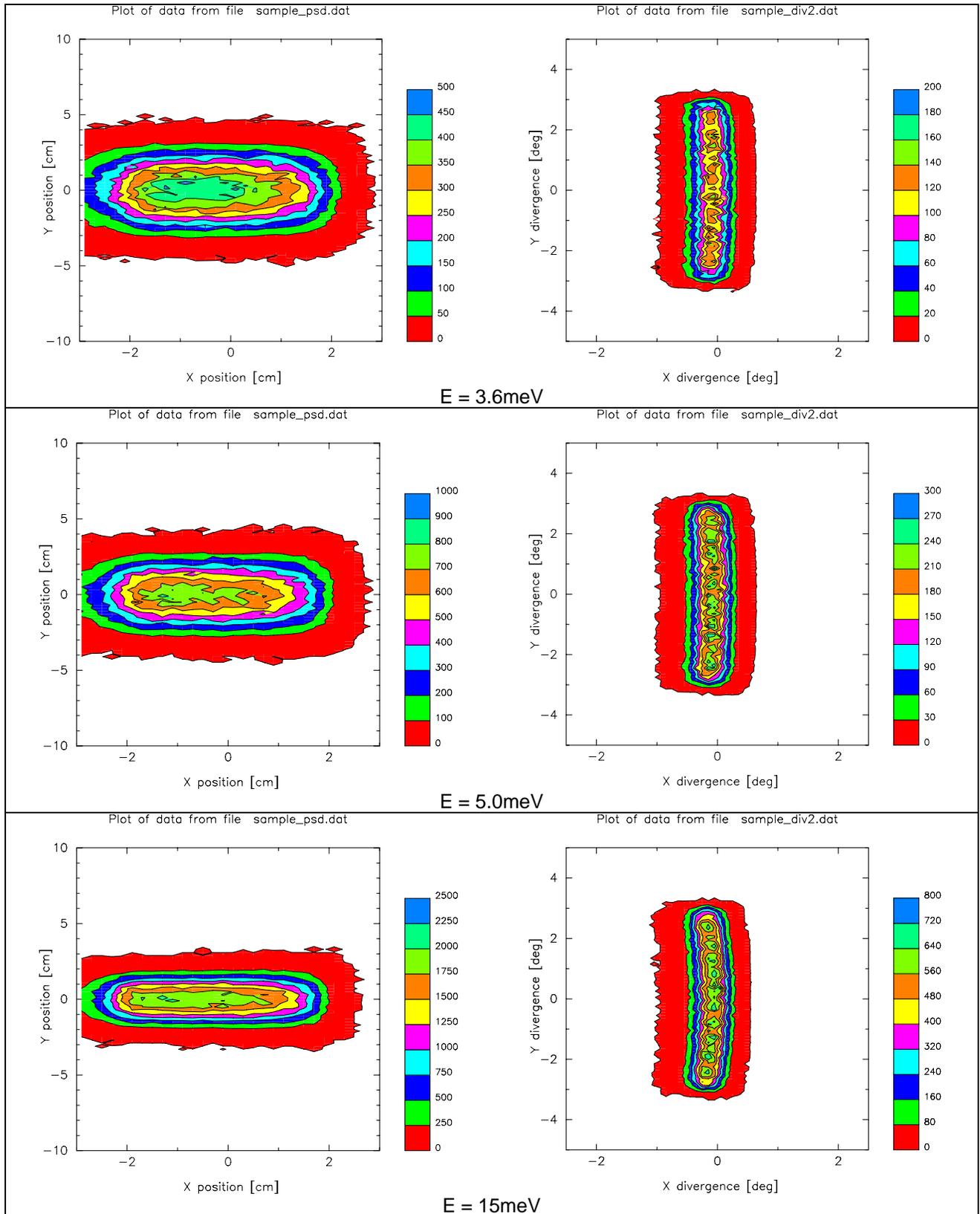


Figure 13: Comparison of flux at sample for ZYB and ZYA with the same peak reflectivity of $R_0=0.8$.



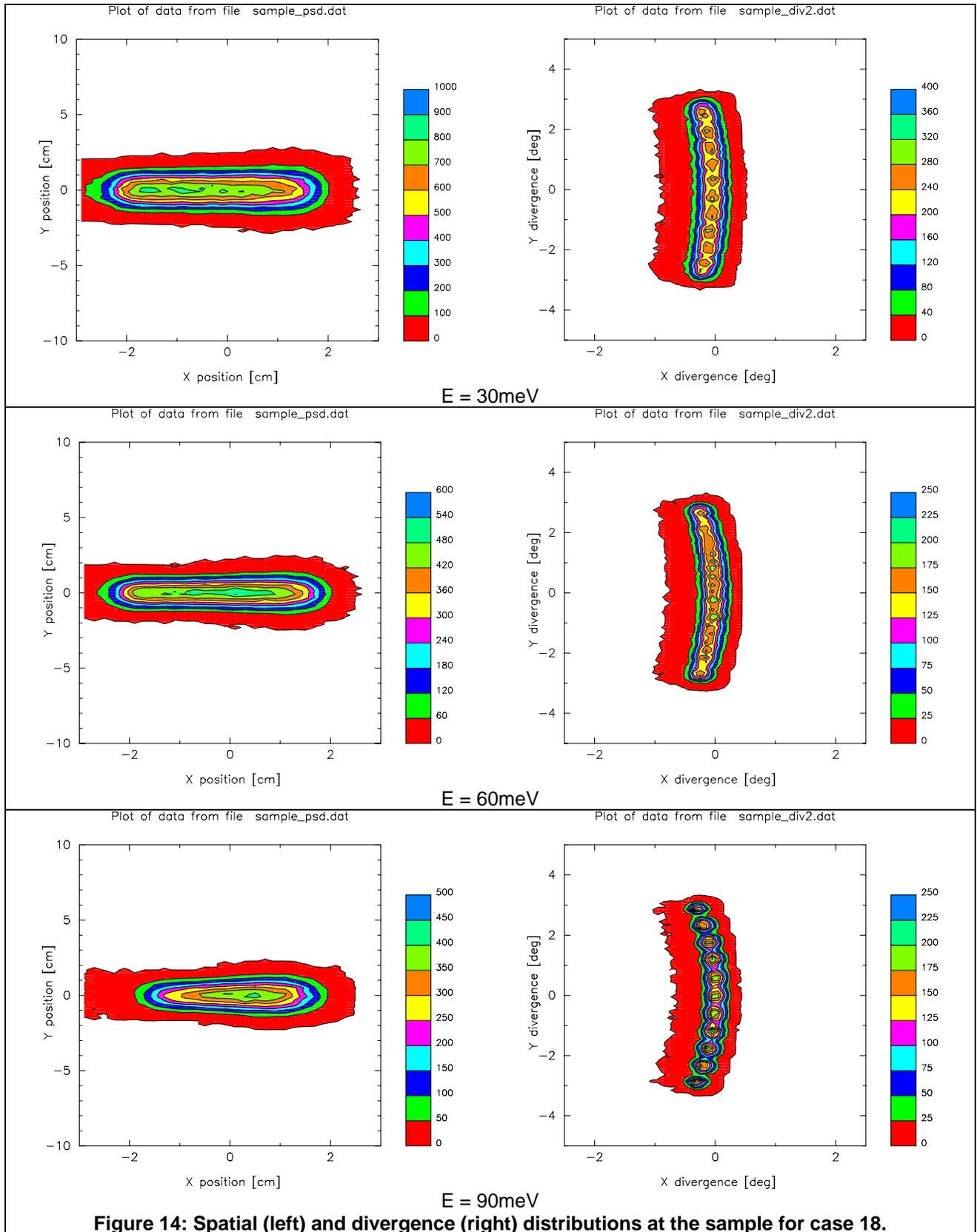
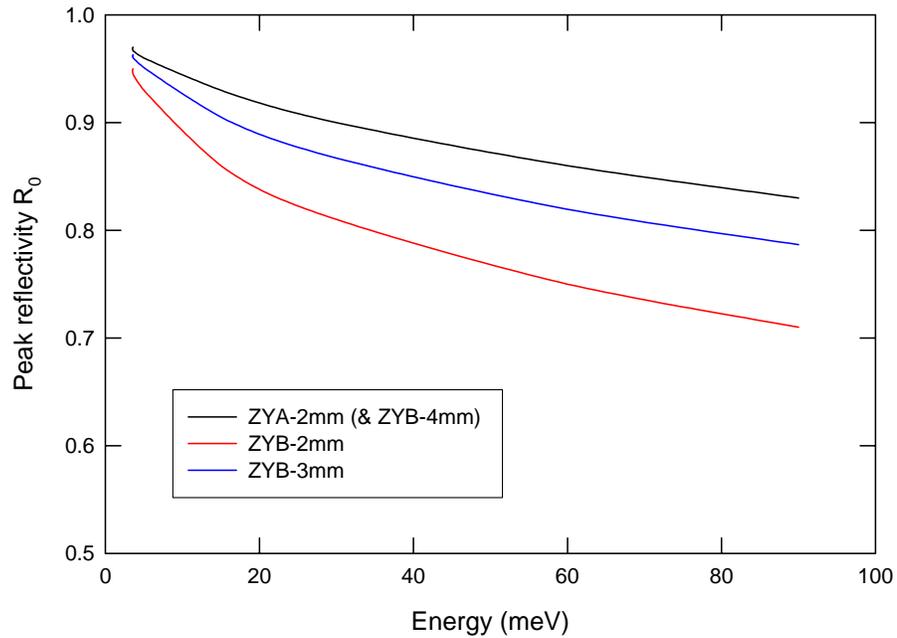


Figure 14: Spatial (left) and divergence (right) distributions at the sample for case 18.

Mosaic spread and reflectivities

The required.



The required.

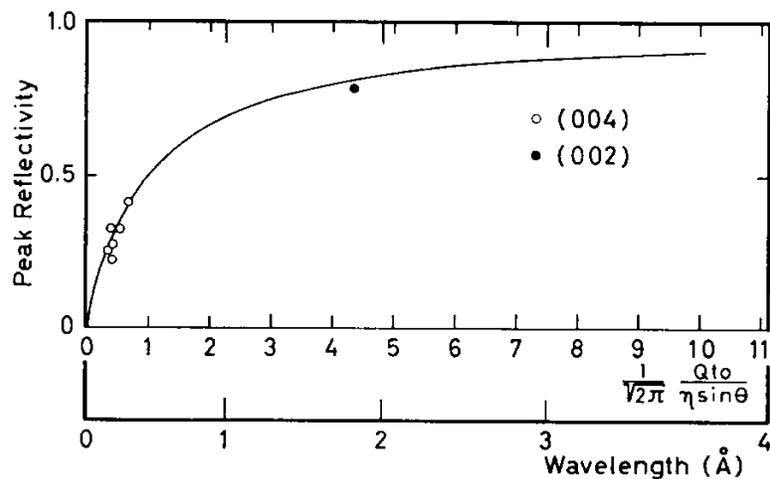


Fig. 2. Calculated and observed value of R^{\max} at $\lambda = 1.20 \text{ \AA}$. The lower abscissa applies to (002) of a sample having parameters $t_0 = 0.37 \text{ cm}$ and $\beta = 1.13^\circ$. One data point for this sample at $\lambda = 1.86 \text{ \AA}$ is included.

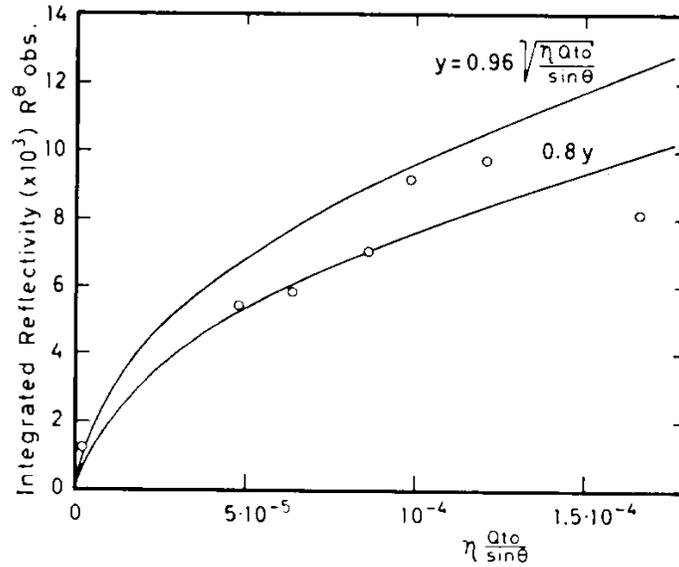


Fig. 3. $R\theta$ for a rotated sample at $\lambda = 1.20 \text{ \AA}$, (004) reflections. The upper curve is calculated for an ideally imperfect, non-absorbing crystal. For the lower curve an empirical attenuation factor of 0.8 is included.

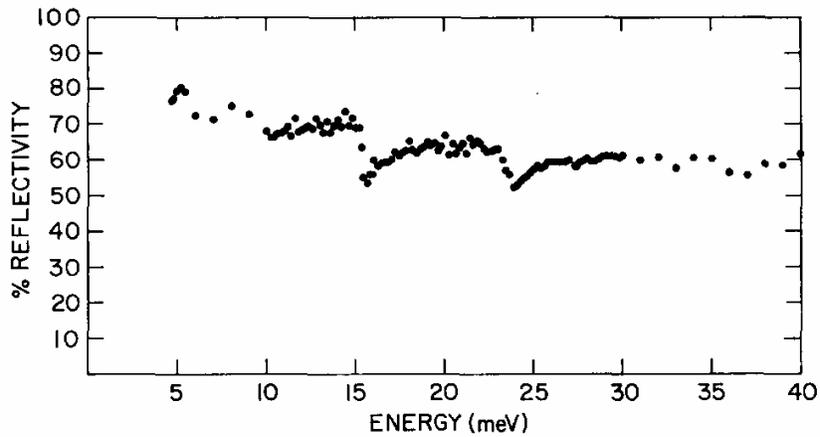


Fig. 1. Energy dependence of pyrolytic graphite (002) reflectivity measured using a chromium sample.

The configuration of the Heusler focusing crystals

The

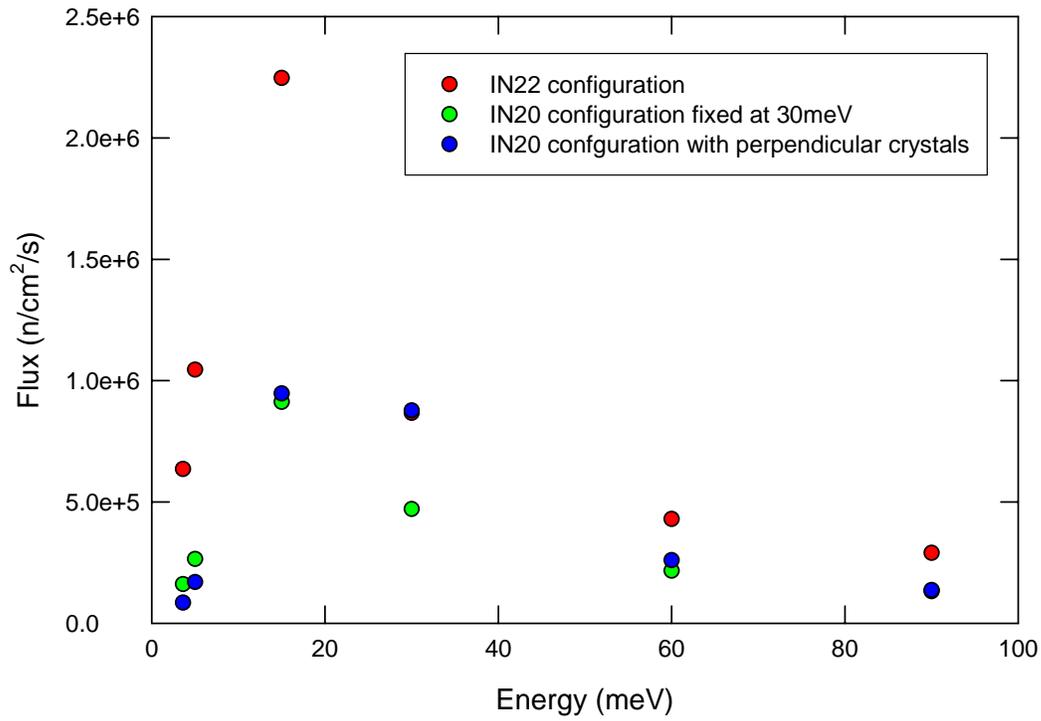
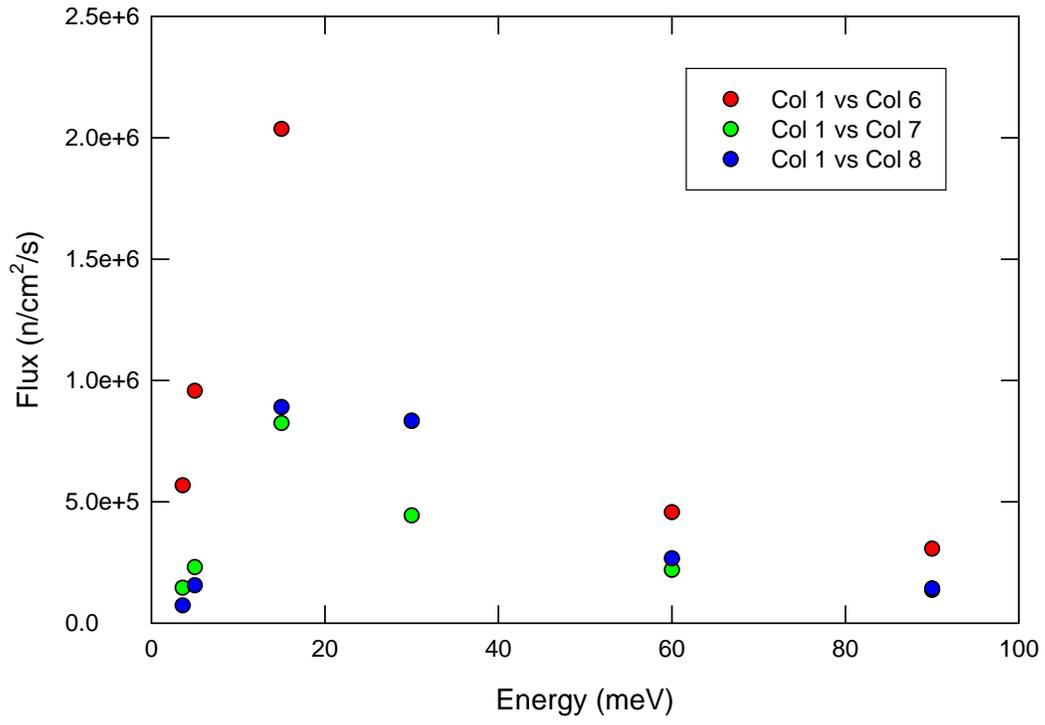


Figure 15: A comparison of the IN22 and IN20 configurations.



Conclusions

The shield.