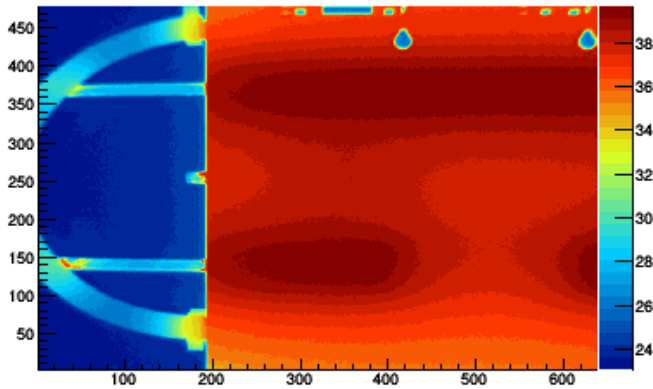# Thermal Camera Update

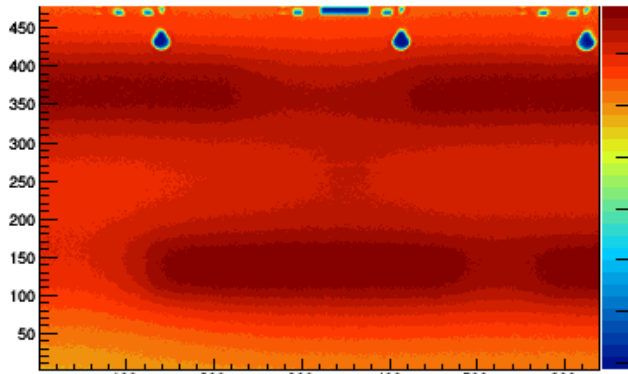William Heidorn
September 21, 2016

General Overview

- Each photo is an average over 200(150 original) frames taken of the stave with the stave set at 45(40) Degrees at the chiller.

- Different arrangements of lenses and camera stave separation are compared to see the effects on viewing the defects

- The short stave is observed first with the 35, 45 and 80 degree lenses with separation of 30cm or 80cm and the long stave is observed with only the 45 and 80 degree lenses at a sepertion of 90cm.

- A line or collection of lines is used to visualize the local change in temperature of the defects along the cooling pipe.
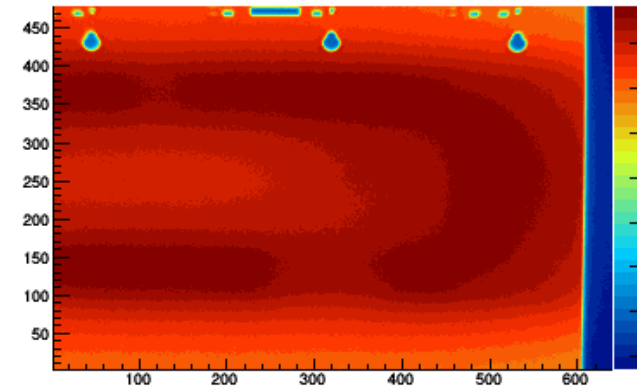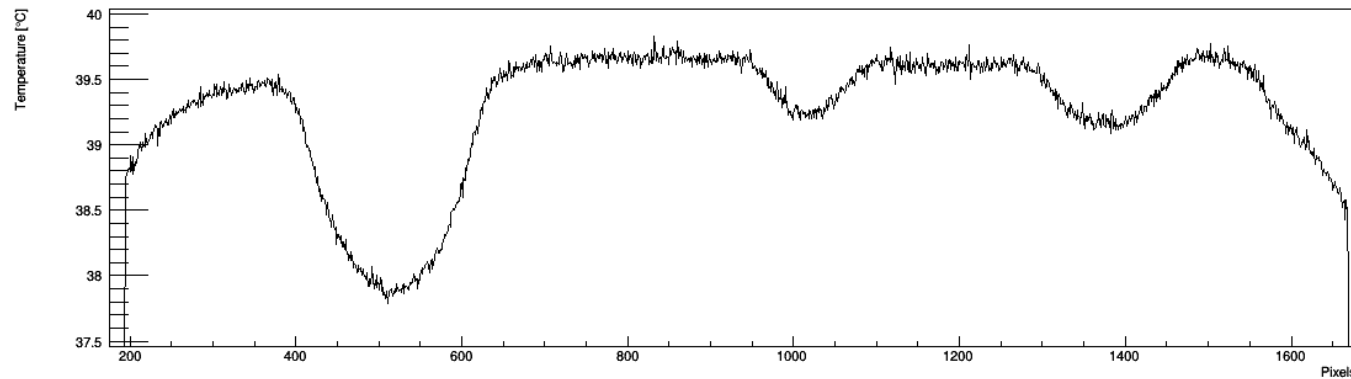
Small Stave Original Lens

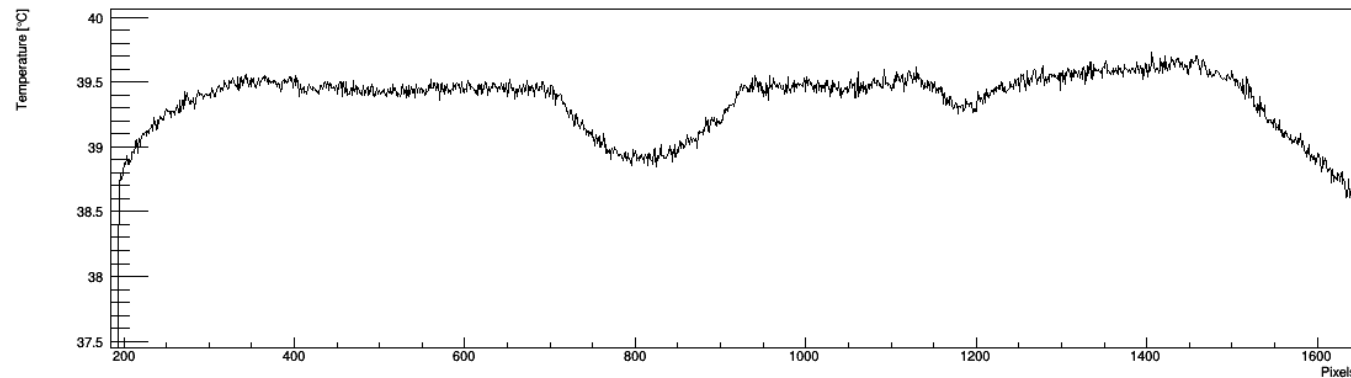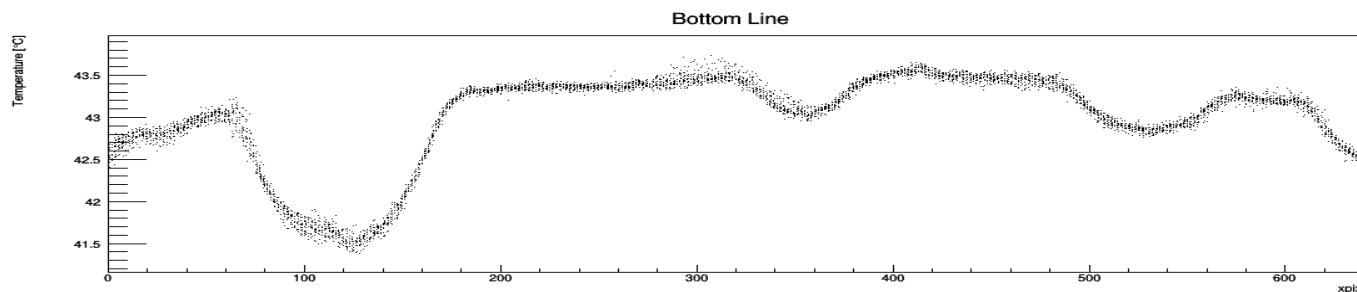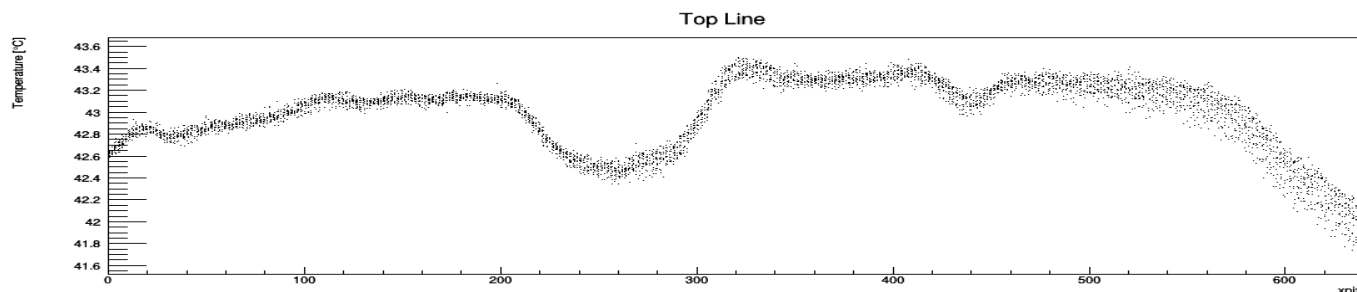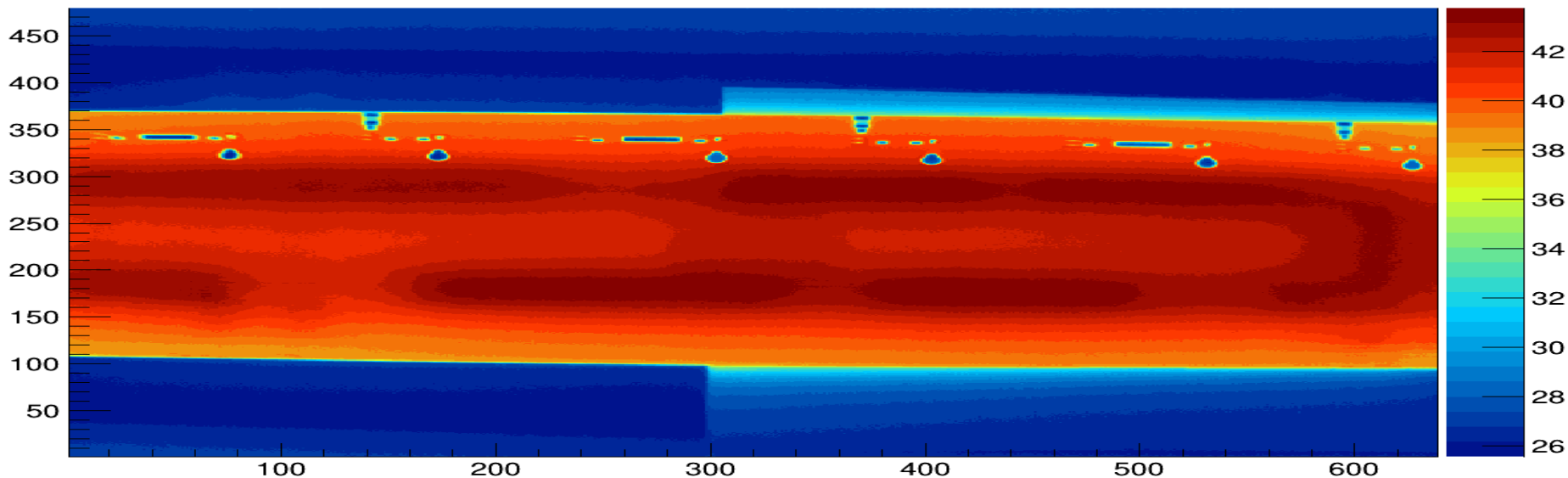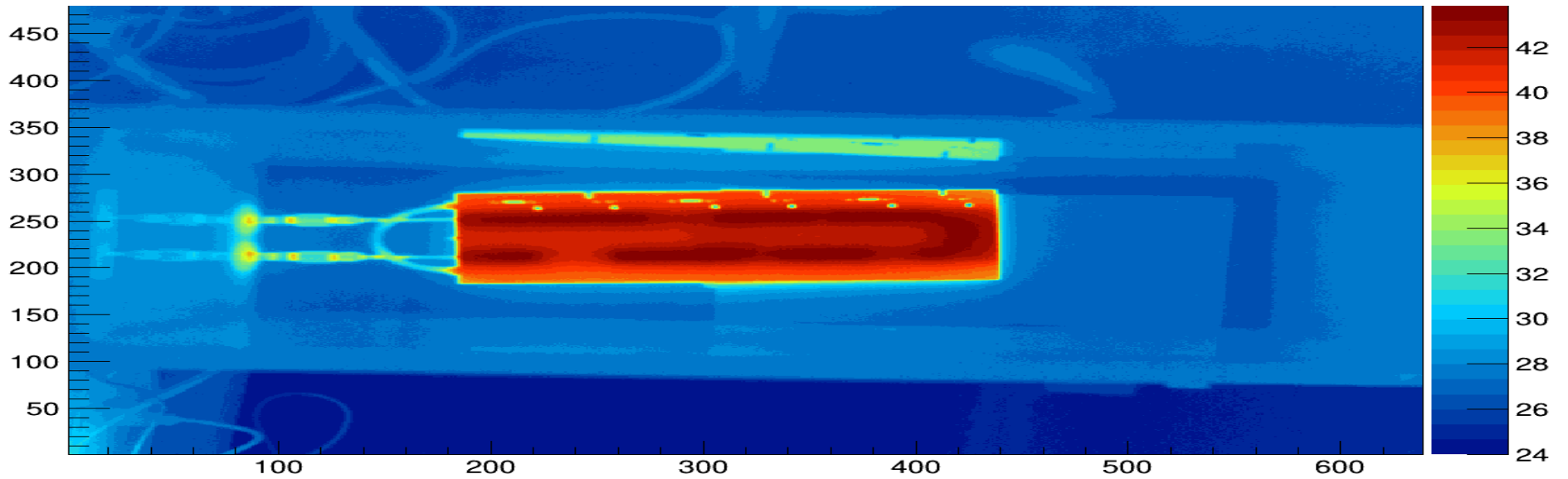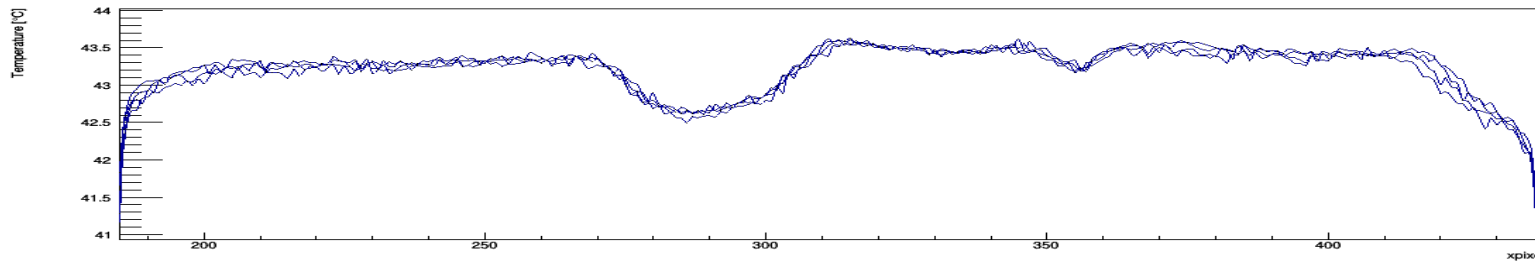Resolution in x
0.19 +/- 0.01 mm/pixel
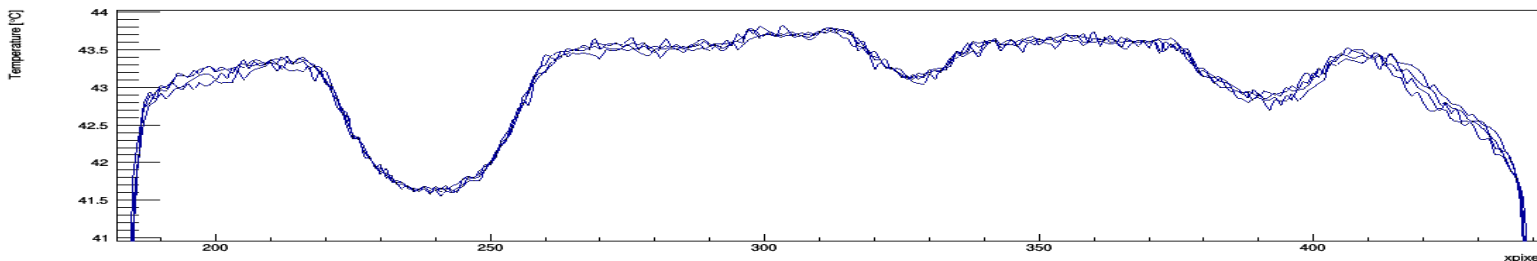
Small Stave 45 Degree Lens 30cm Separation

ypixel:xpixel {temp}

Top Line

Resolution in x
0.39 +/- 0.03 mm/pixel
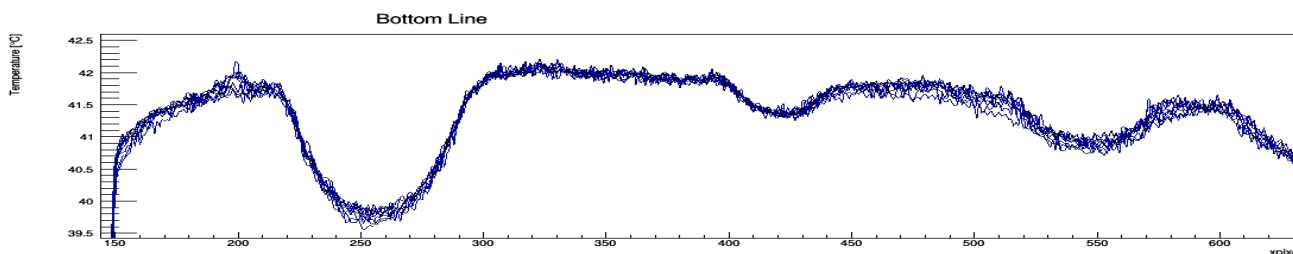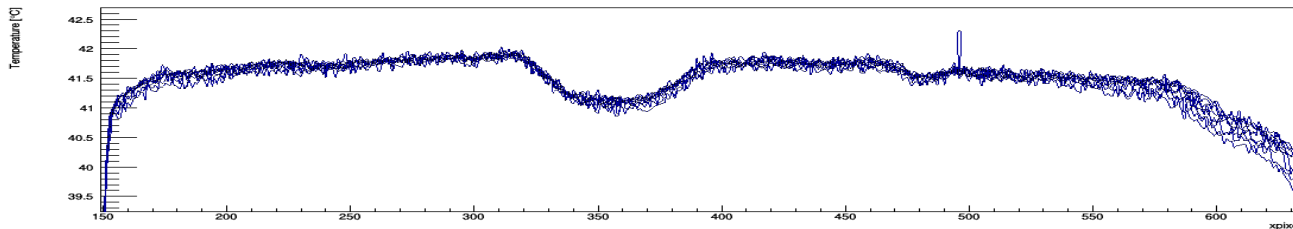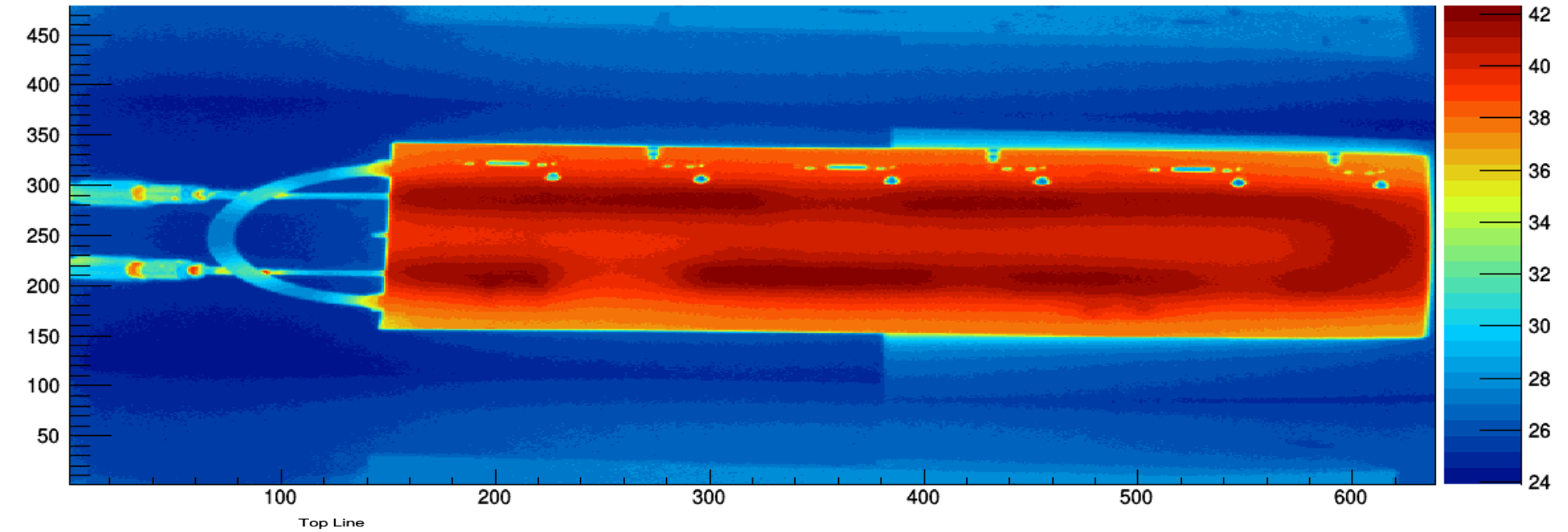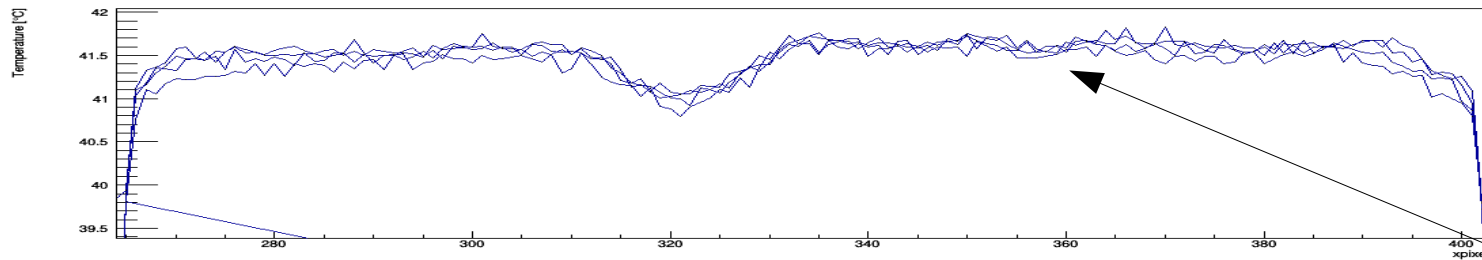
Bottom Line

Small Stave 45 Degree Lens 90cm Separation

Resolution in x
1.0 +/- 0.2 mm/pixel

Small Stave 80 Degree Lens 30cm Separation

Resolution in x
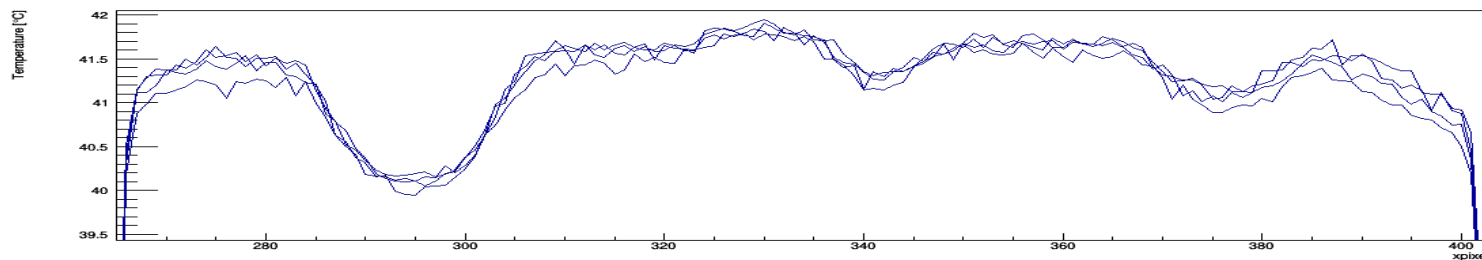0.58 +/- 0.07 mm/pixel
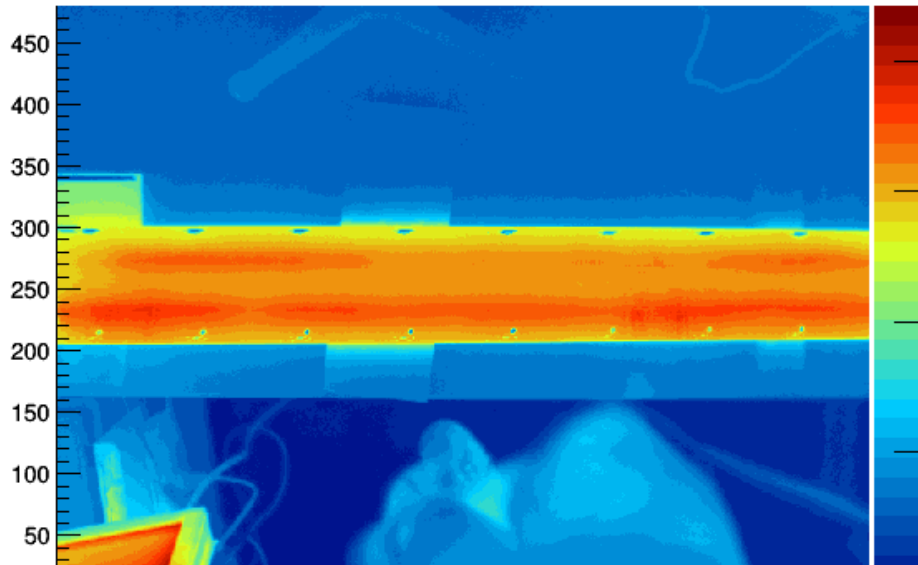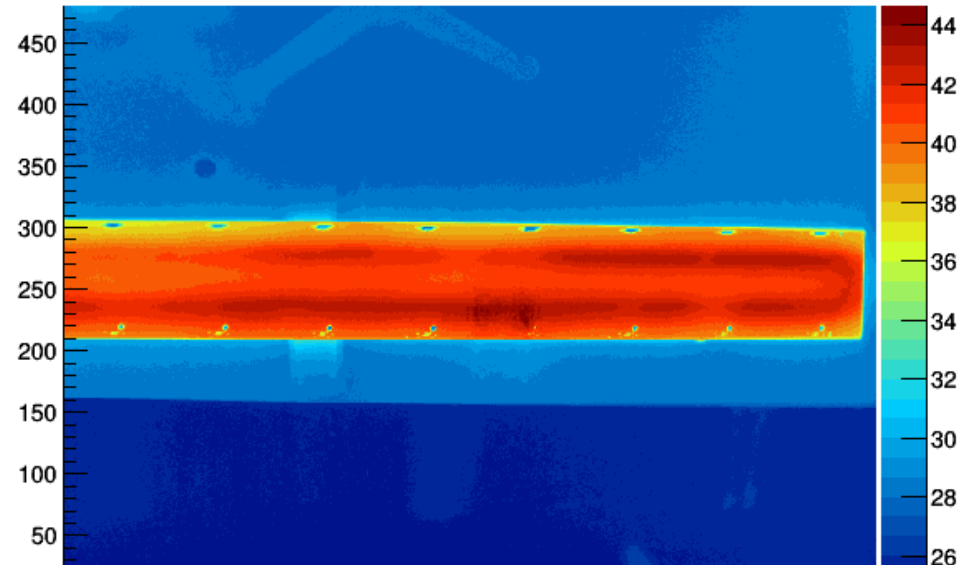
Small Stave 80 Degree Lens
90cm Separation
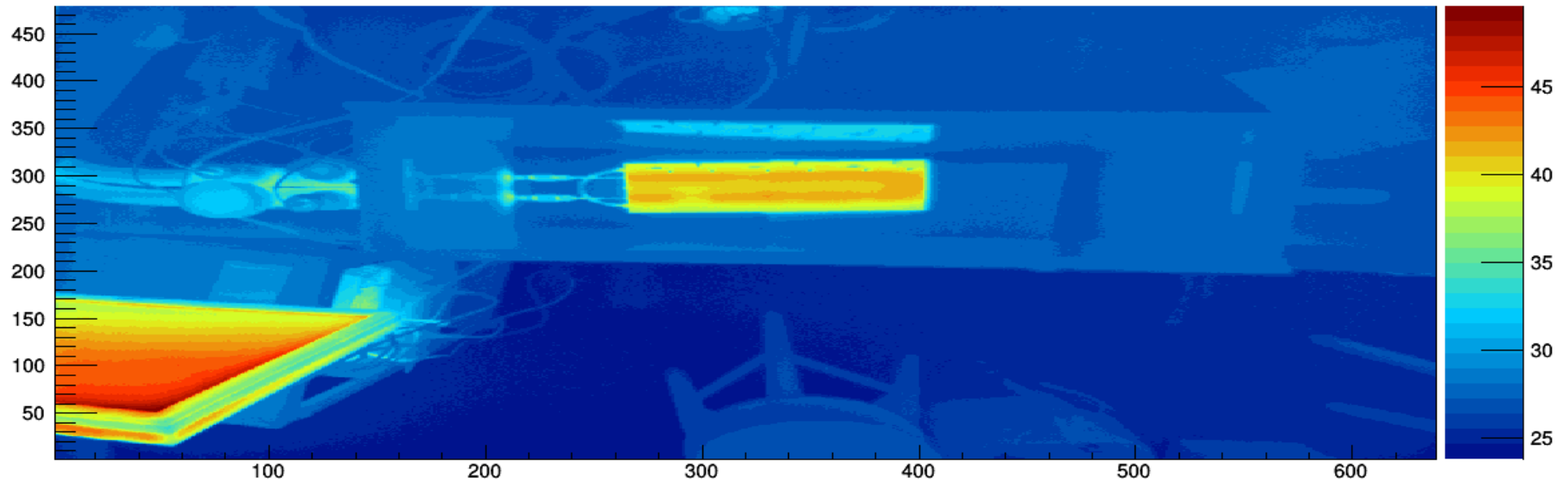
Resolution in x
2.2 +/- 0.5 mm/pixel

Smallest defect not
very visible. Might not
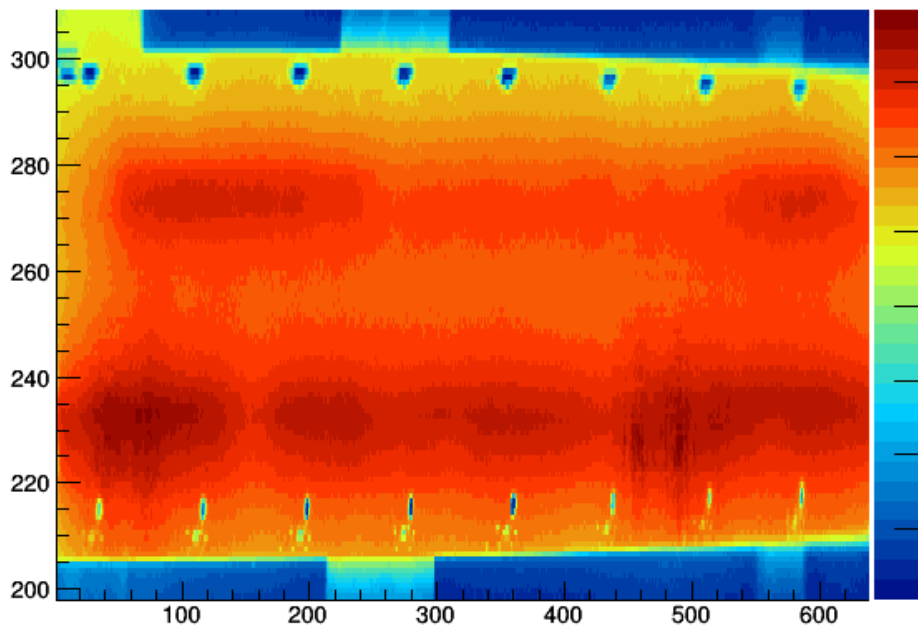be distinguishable.
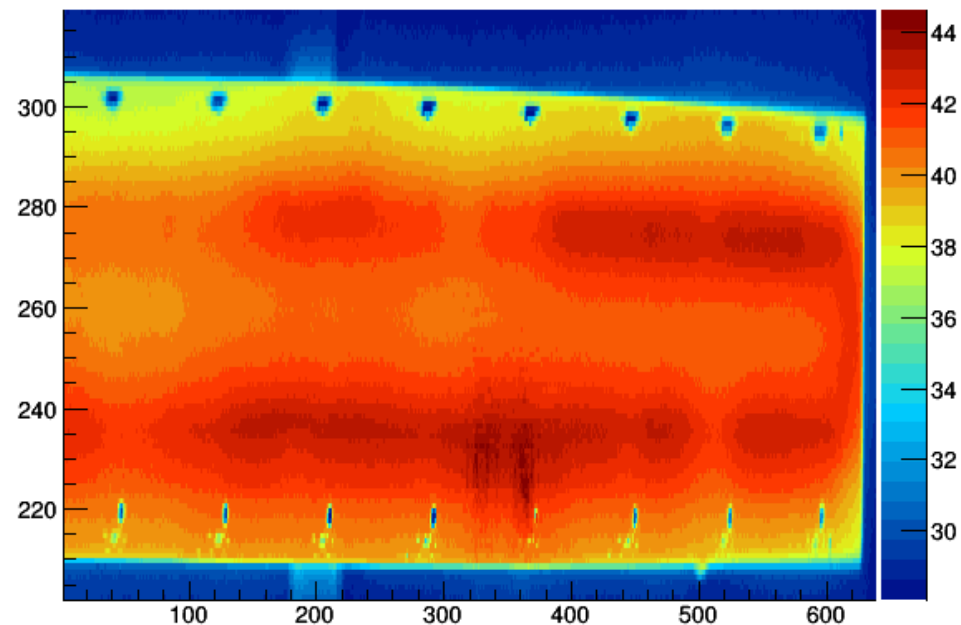
Large Stave 45 Degree Lens 90cm Separation

Large Stave 45 Degree Lens
90cm Separation
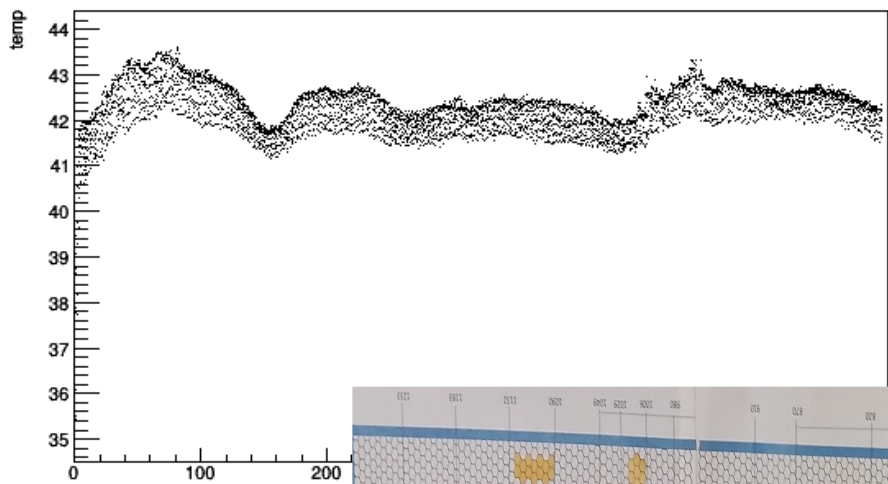
temp:xpixel {(ypixel>270)&&(ypixel<280)&&(temp>35)}
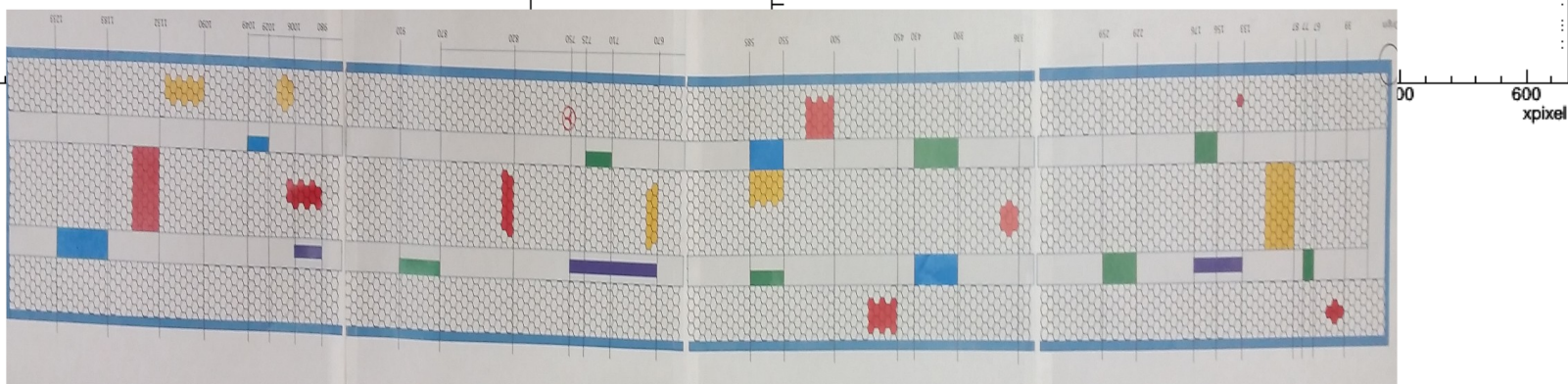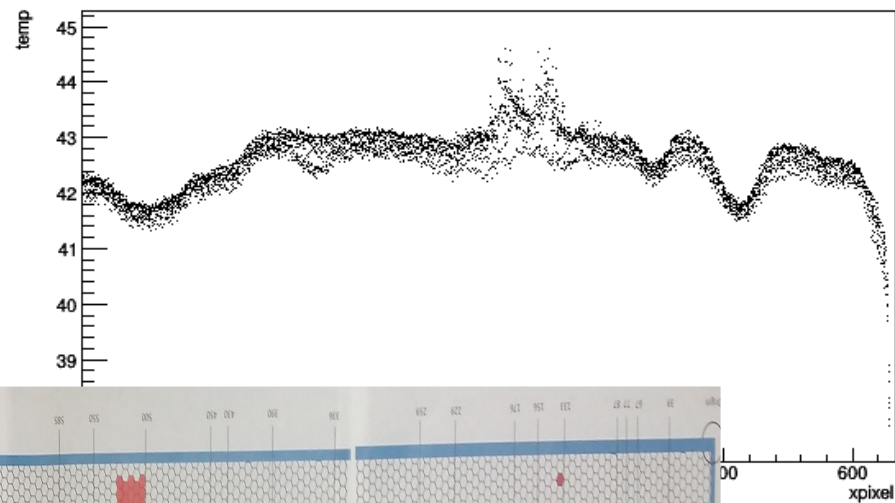
temp:xpixel {(ypixel>270)&&(ypixel<280)&&(temp>35)}

temp:xpixel {(ypixel>230)&&(ypixel<240)&&(temp>35)}

temp:xpixel {(ypixel>230)&&(ypixel<240)&&(temp>35)}

Large Stave Flip 45 Degree Lens 90cm Separation

Large Stave Flip 45 Degree Lens 90cm Separation

temp:xpixel {(ypixel>238)&&(ypixel<246)&&(temp>35)}

temp:xpixel {(ypixel>273)&&(ypixel<281)&&(temp>35)}

temp:xpixel {(ypixel>278)&&(ypixel<286)&&(temp>35)}
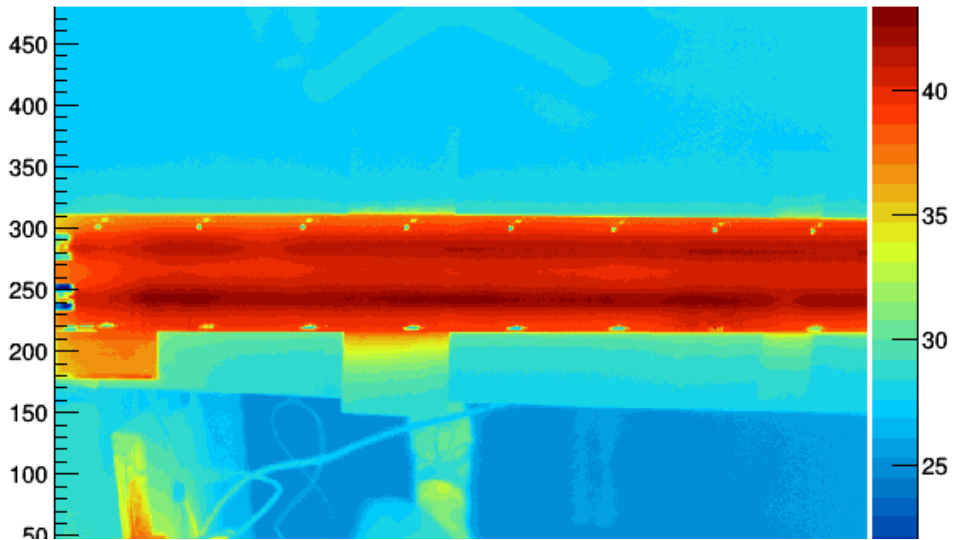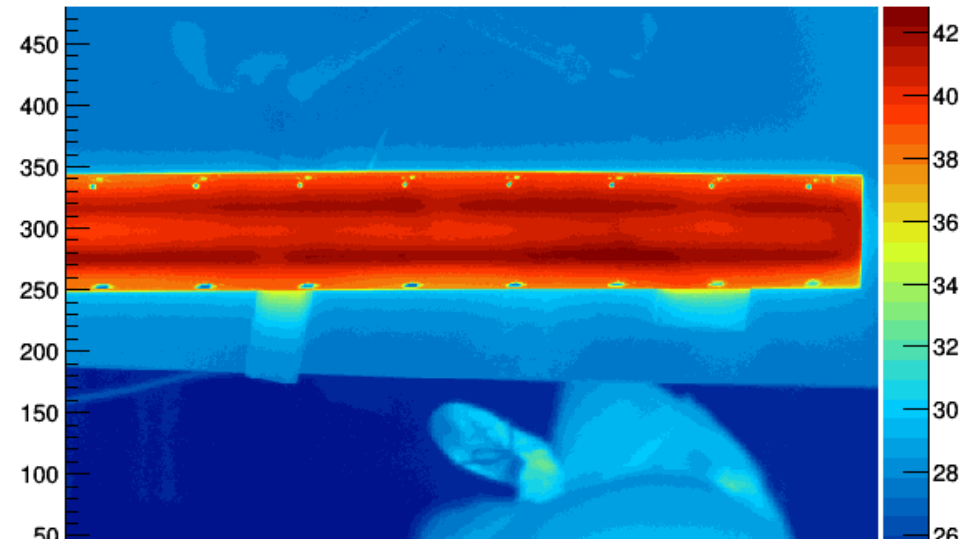
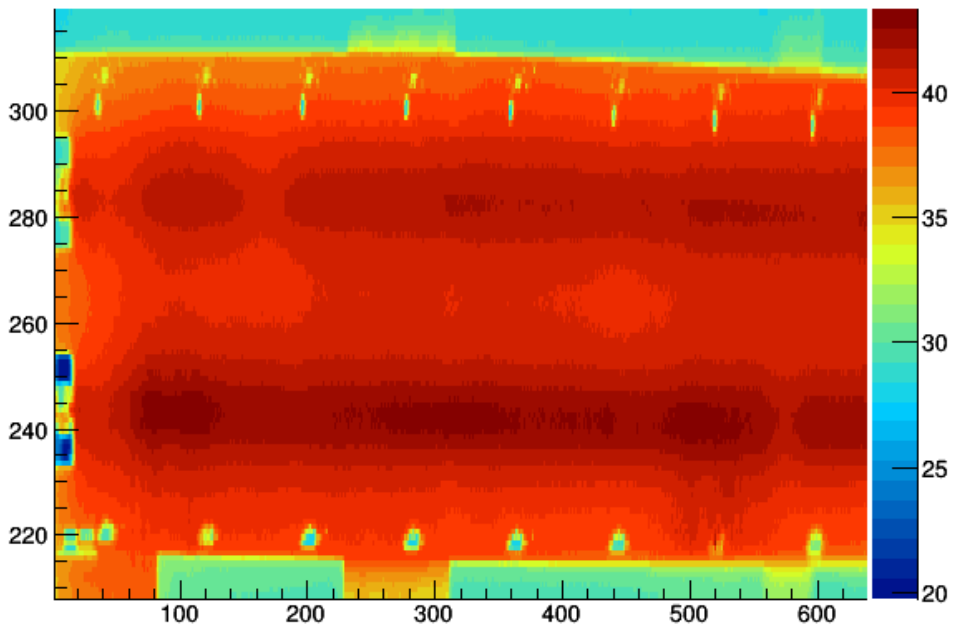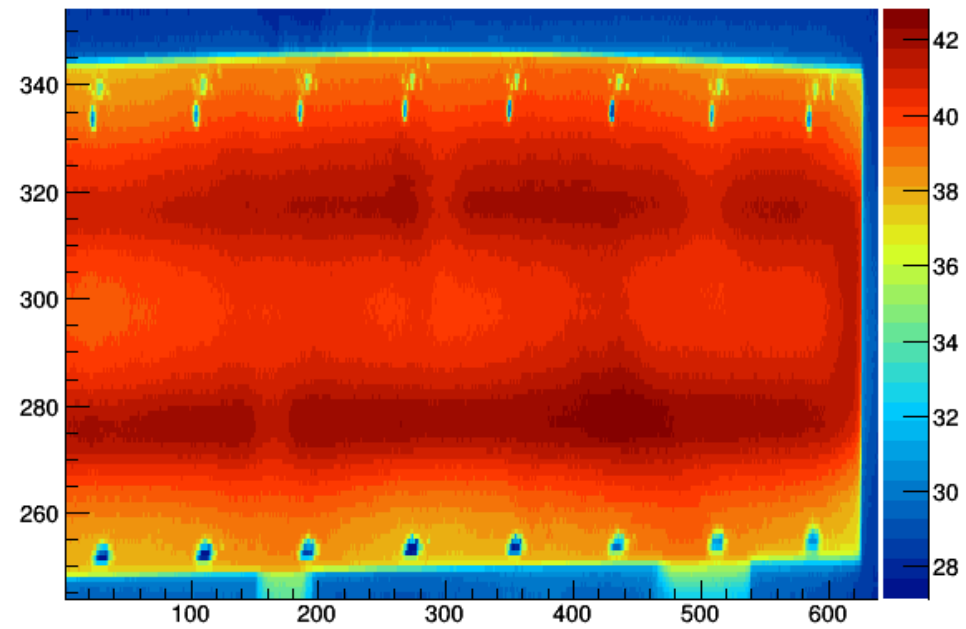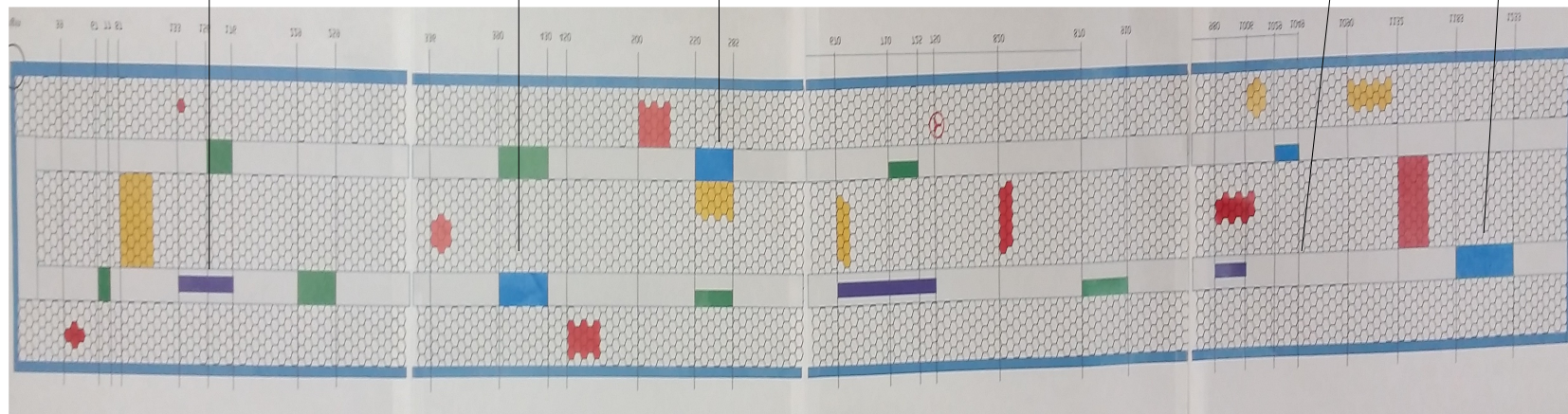temp:xpixel {(ypixel>313)&&(ypixel<321)&&(temp>35)}

Large Stave 80 Degree Lens 90cm Separation
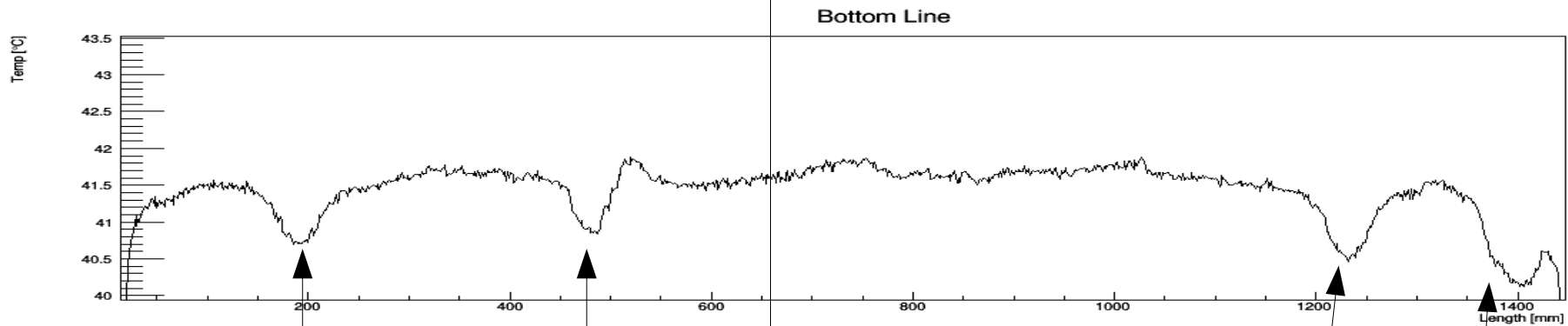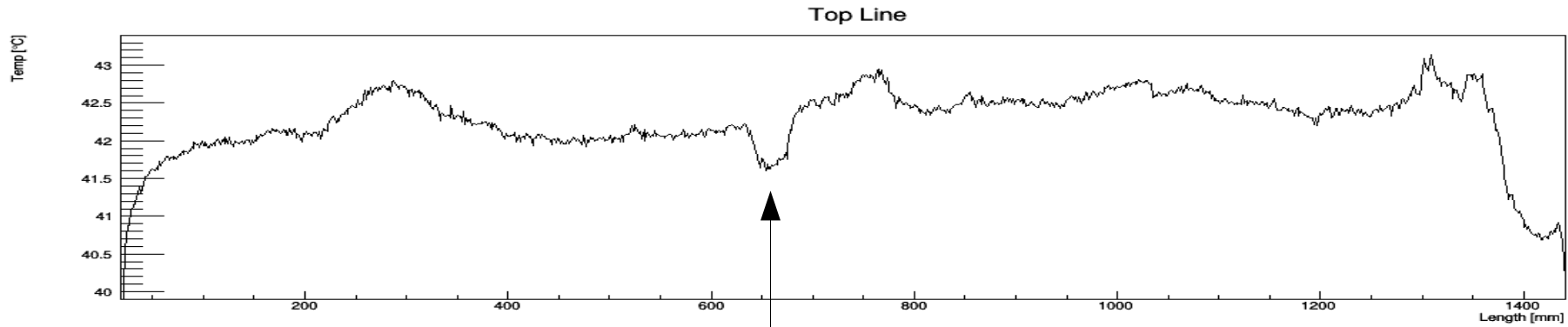
ypixel:xpixel {temp}

ypixel:xpixel {temp}

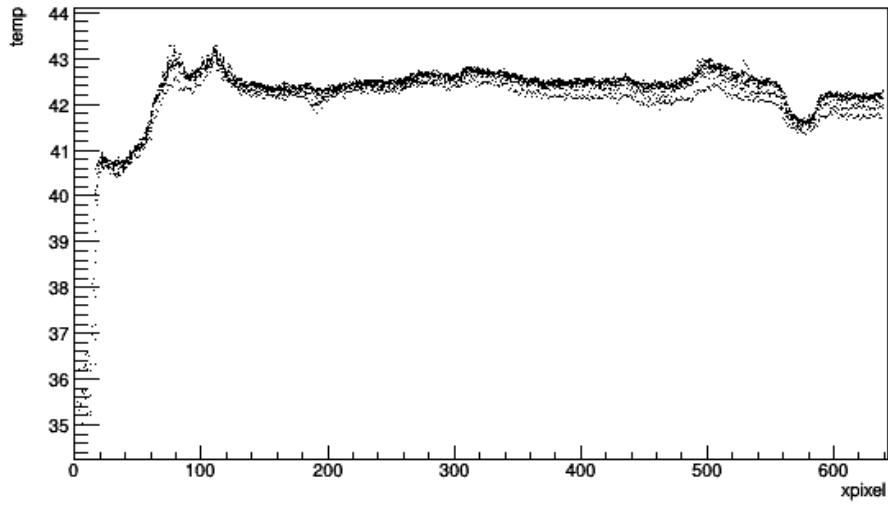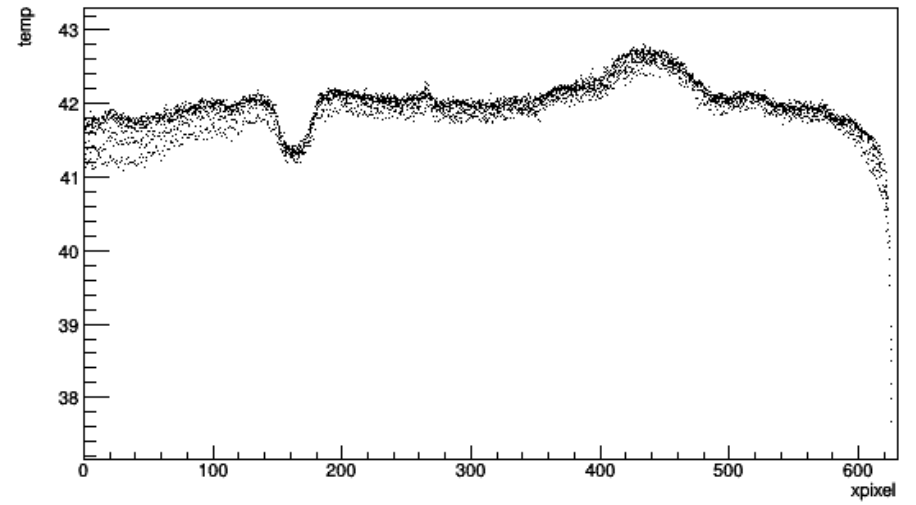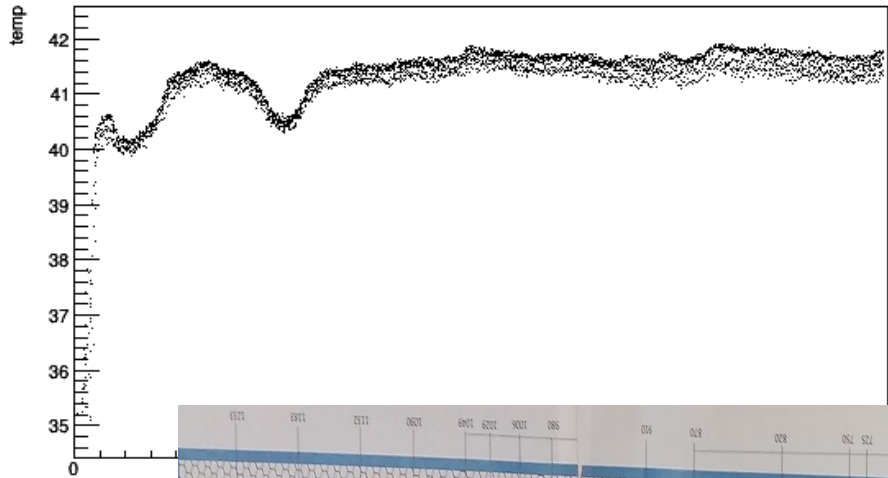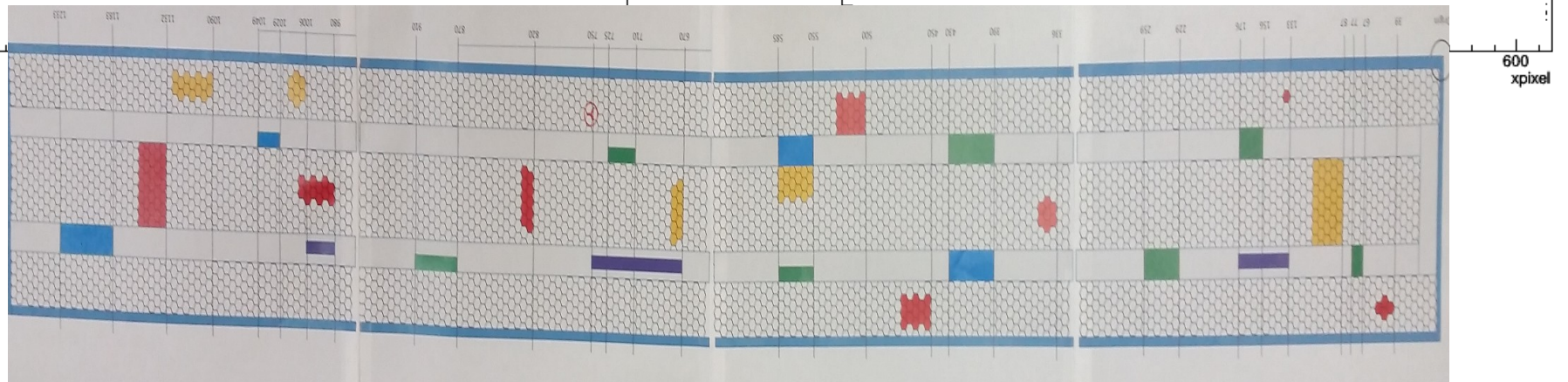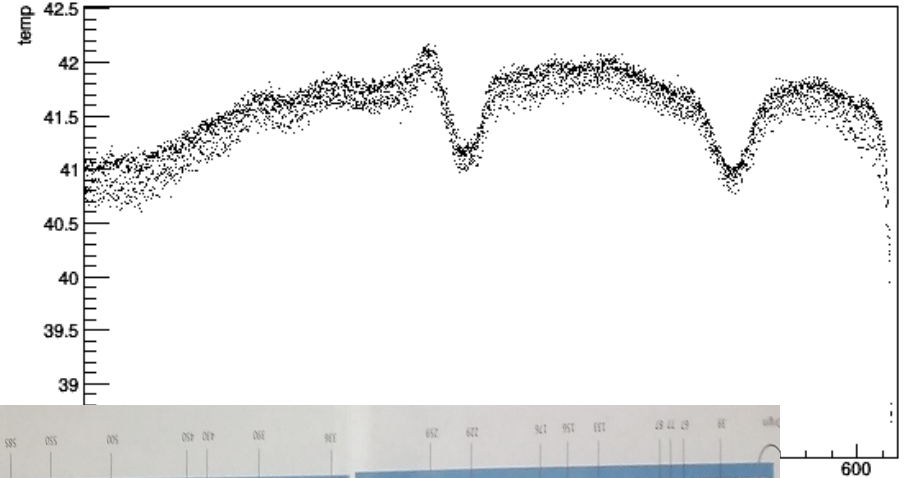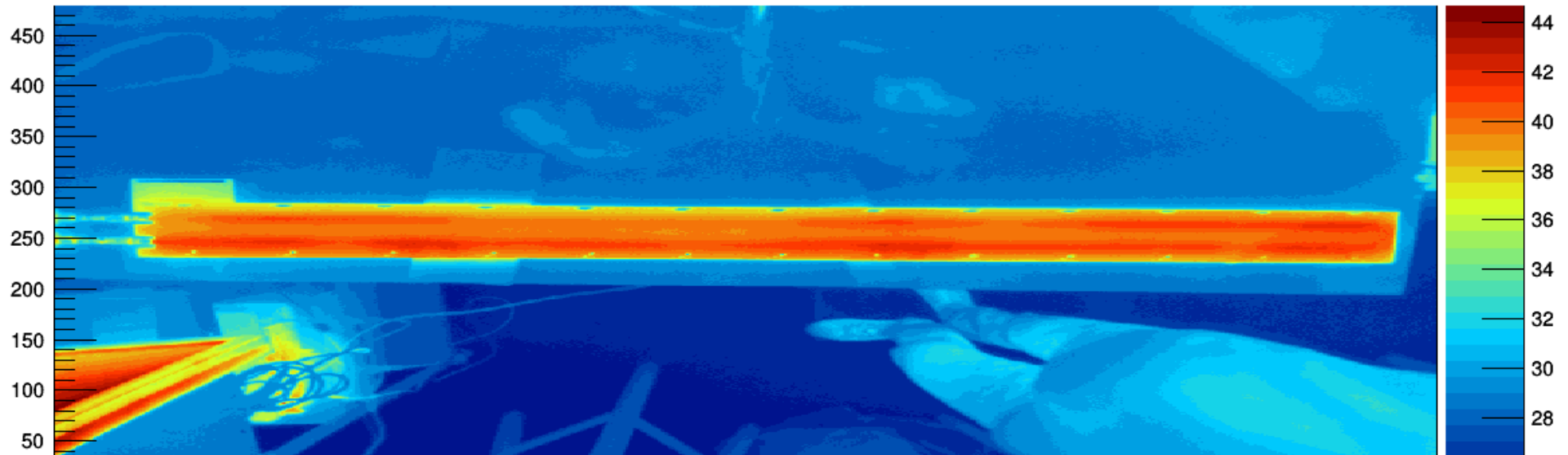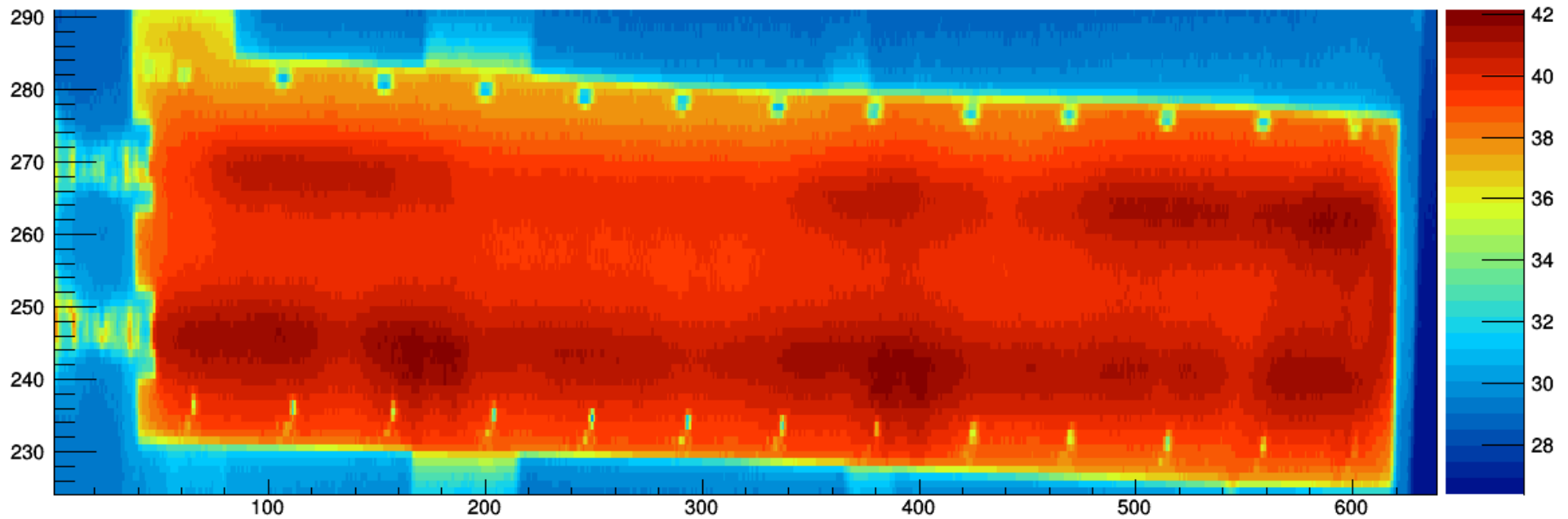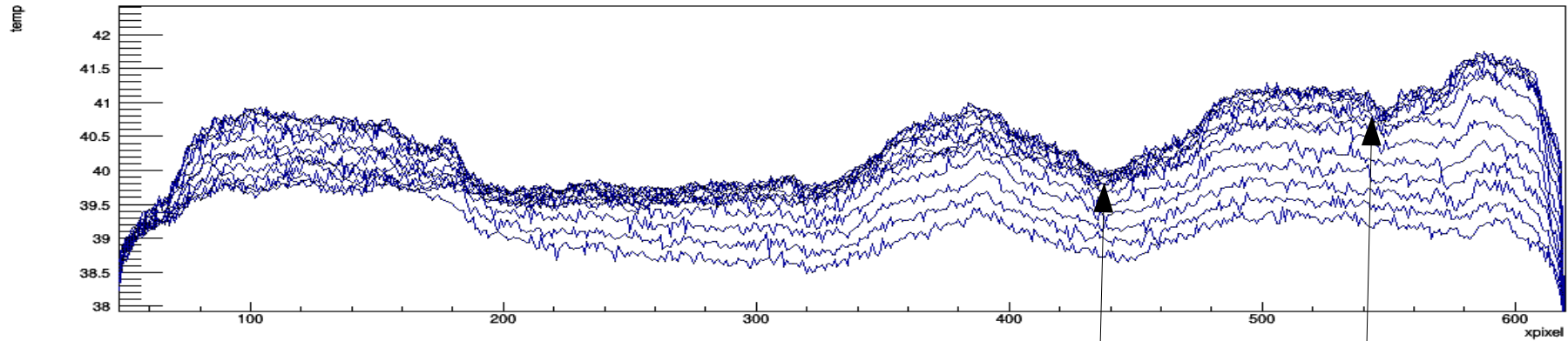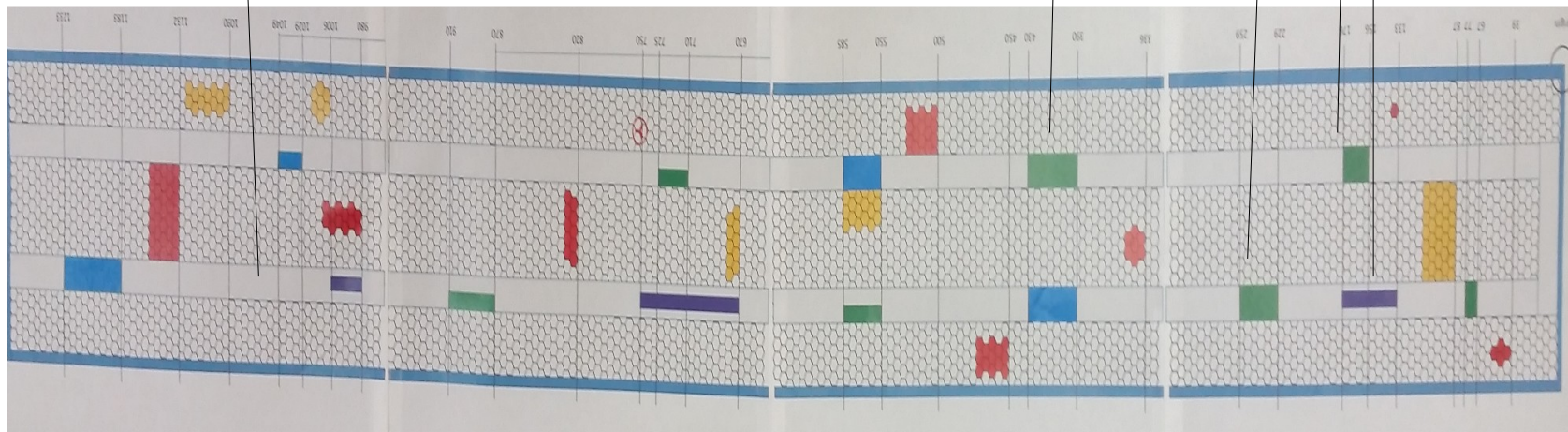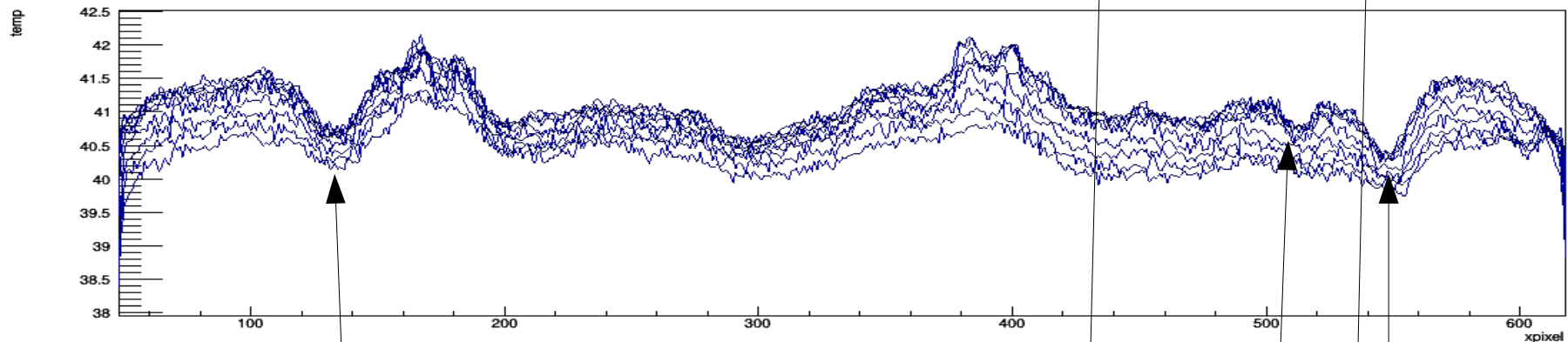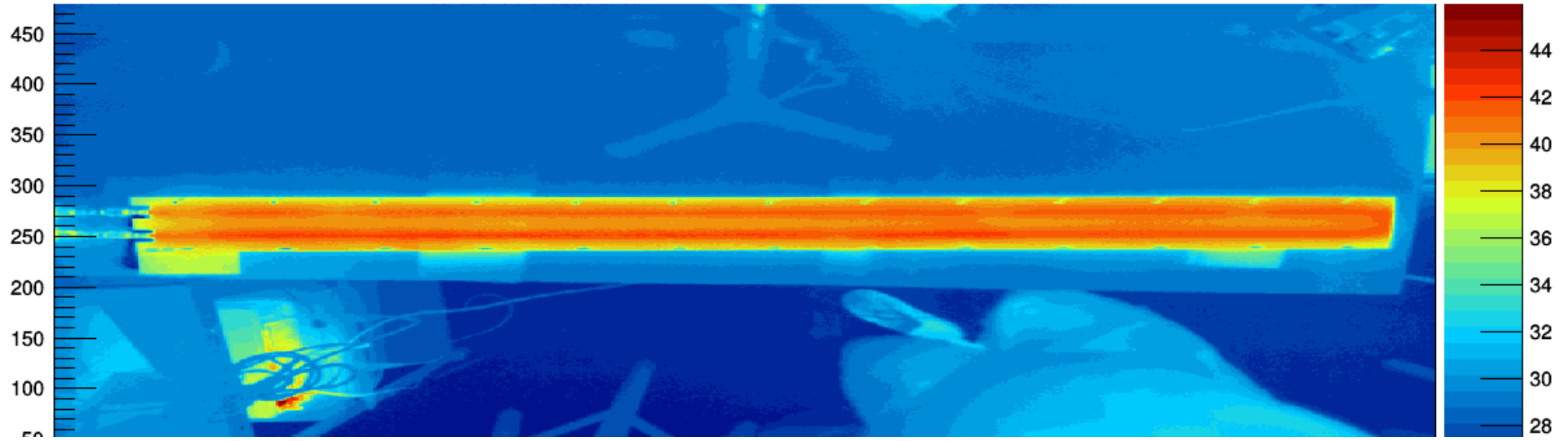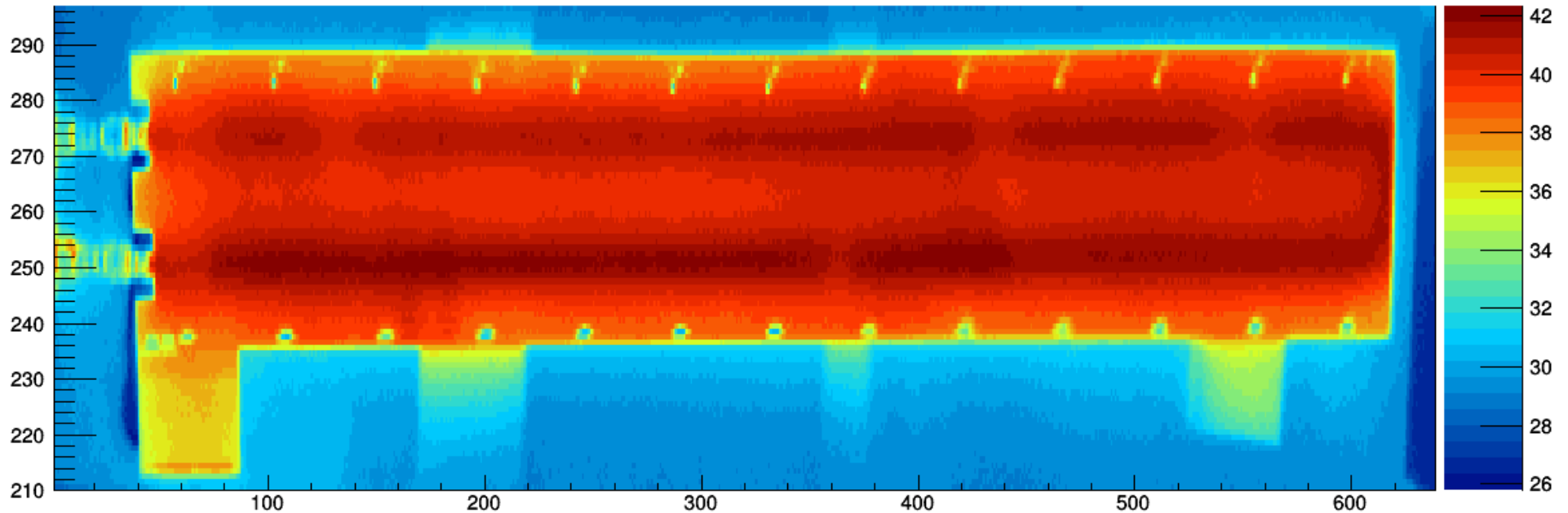# Large Stave 80 Degree Lens 90cm Separation

Large Stave Flip 80 Degree Lens 90cm Separation
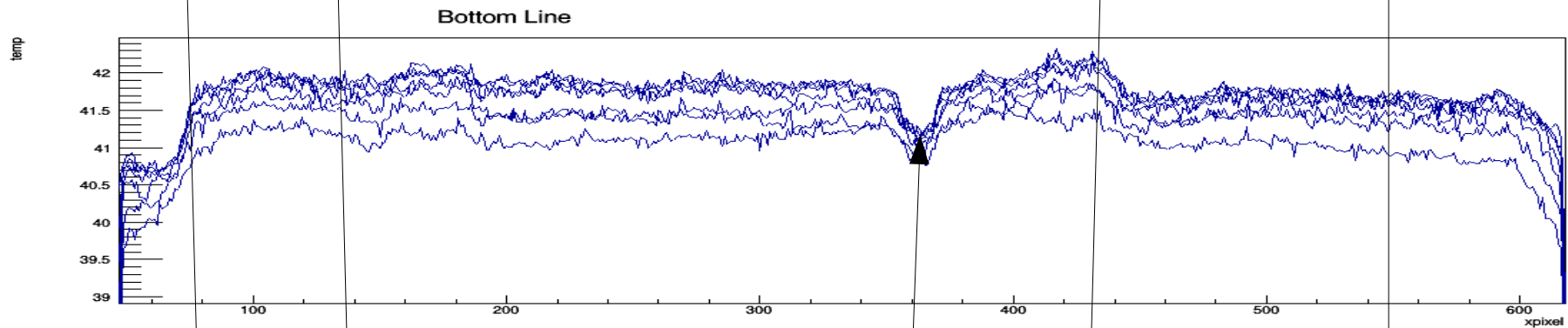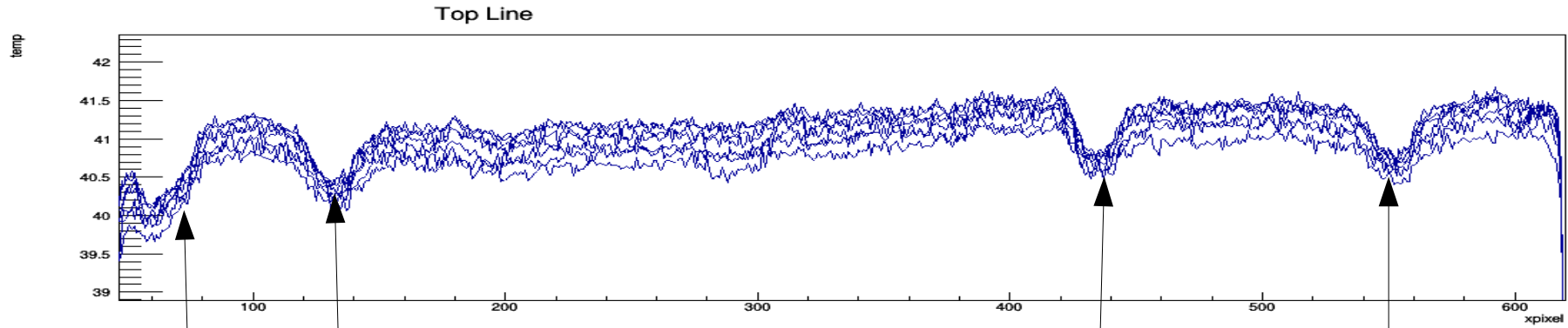
Large Stave Flip 80 Degree Lens 90cm Separation
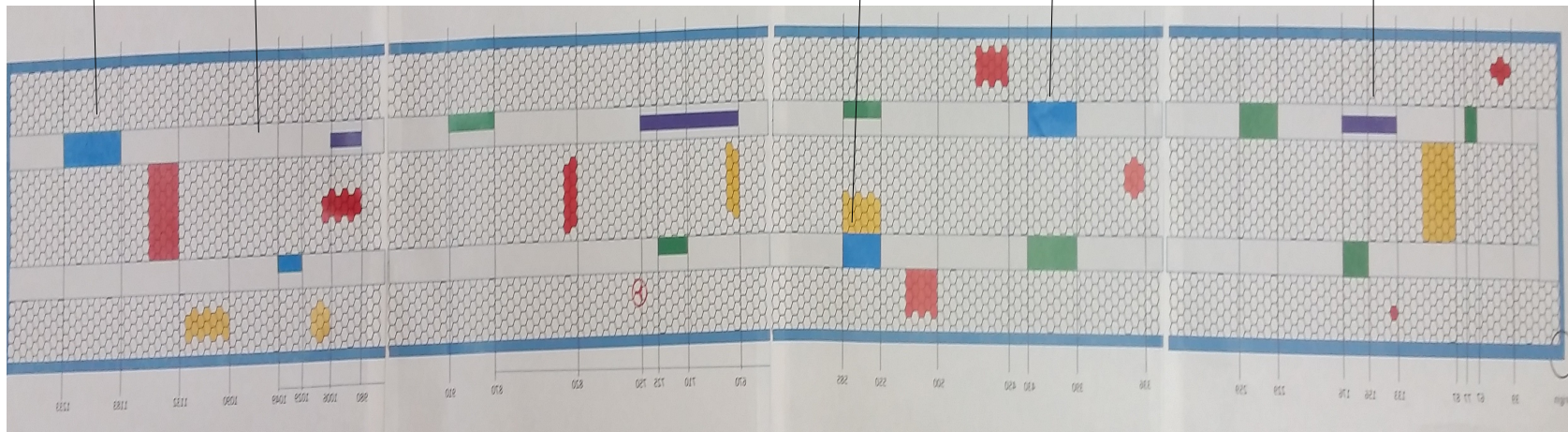
Some Conclusions

- Able to easily detect green and blue defects when they cover the entire cooling pipe. Generally only visible when on side that has defect. This is seen as a dip similar to the small cooling pipe's defects. Sometimes they seem to be visible as a peak when they are on the back side.

- Unable to see any partial blue or green defects

- Purple defects seem to be variable and generally not visible.

- The unknown defect seems to be a large portion that has a defect on both sides.