Motion blur removal with orthogonal parabolic exposures

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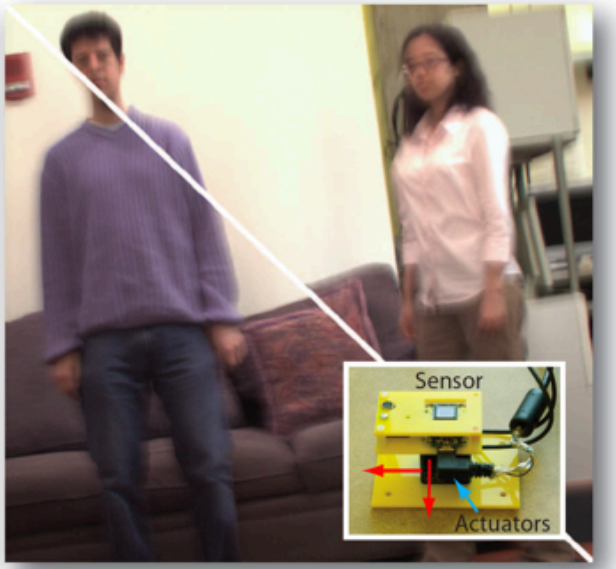
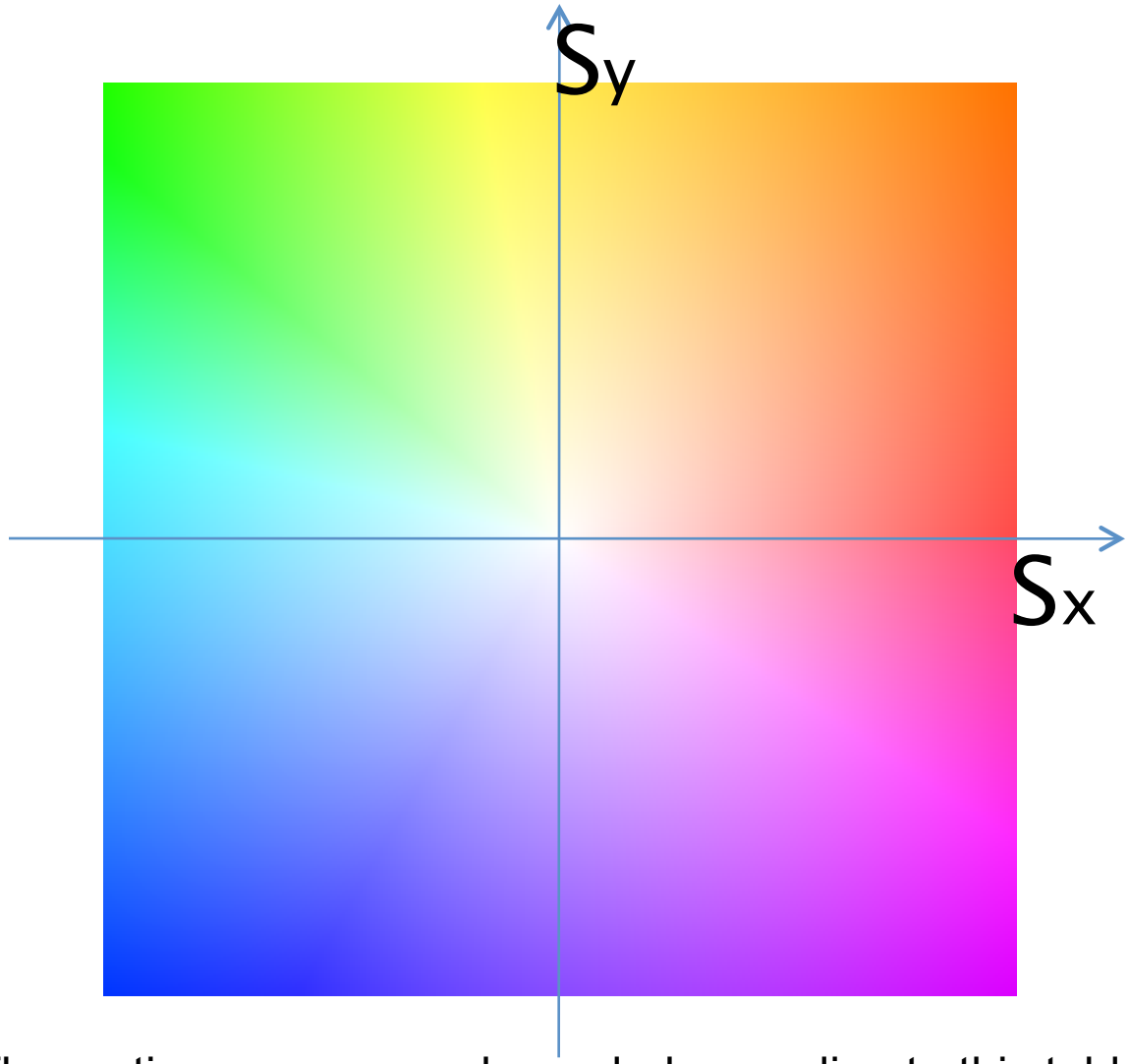
Static camera image



Orthogonal parabolic camera: input

Orthogonal parabolic camera: deblurred output

Motion color code

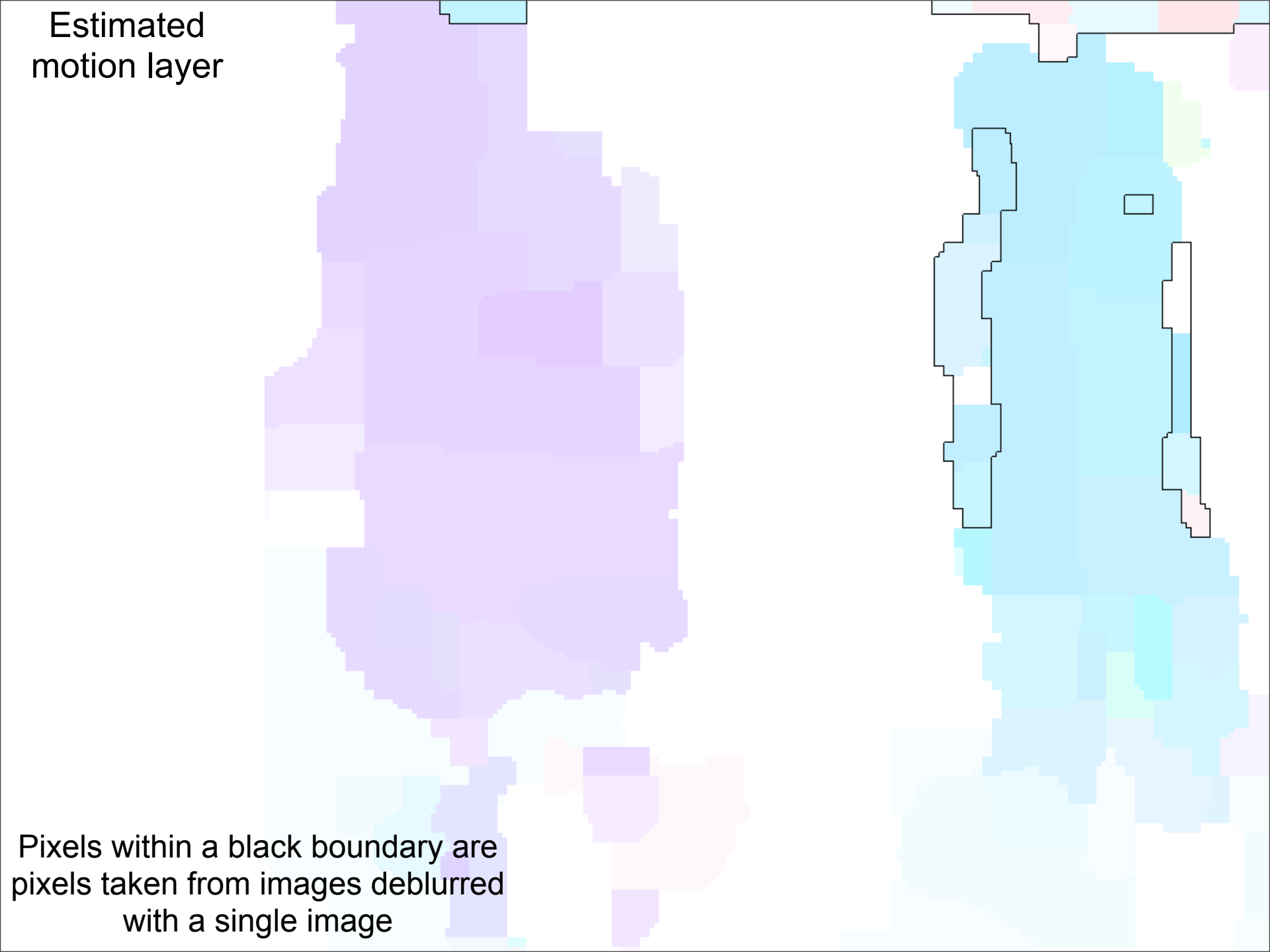


The motion maps are color coded according to this table.

2D constant velocity object motion deblurring examples

Image from a static camera - 500ms exposure

Image from a horizontal parabolic camera - 200ms exposure


Estimated
motion layer
Pixels within a black boundary are
pixels taken from images deblurred
with a single image

Deblurred image

Cropped from the image from a static camera

- 500ms exposure

Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the deblurred image

Image from a static camera
- 500ms exposure

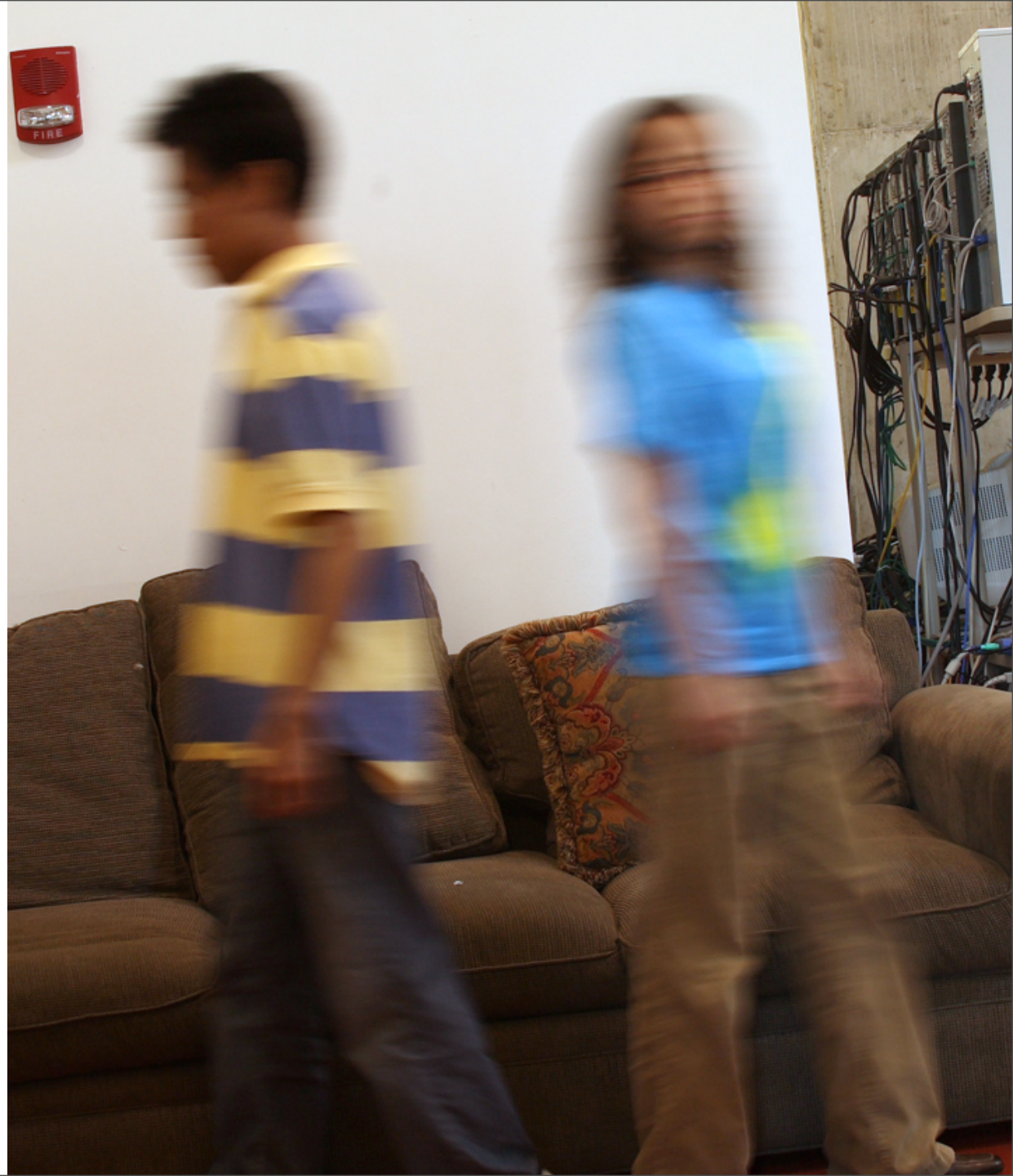
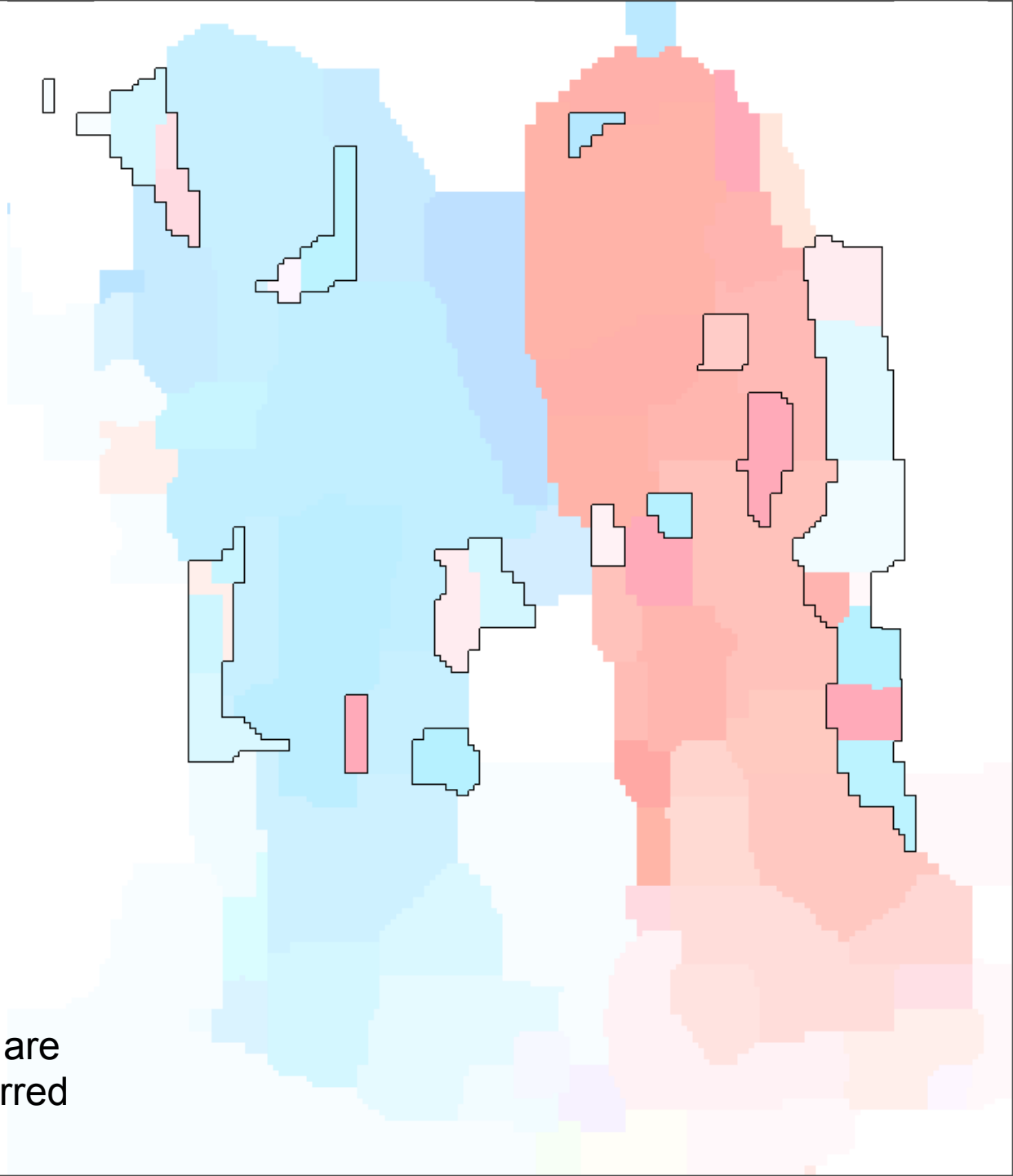


Image from a horizontal parabolic camera - 200ms exposure

Estimated motion layer



Pixels within a black boundary are pixels taken from images deblurred with a single image

Deblurred image

Cropped from the image from a static camera - 500ms exposure

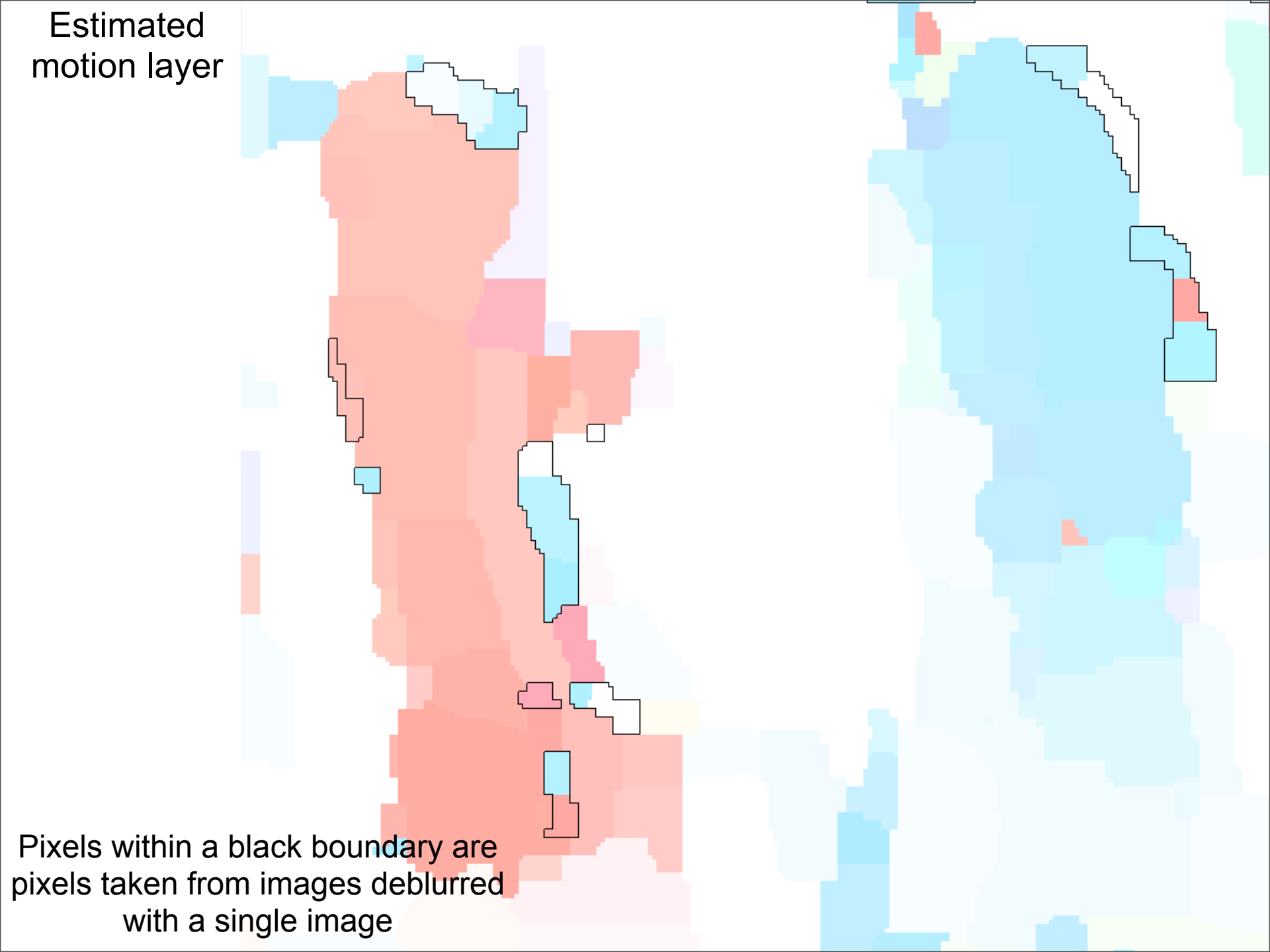
Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the deblurred image

Image from a static camera - 500ms exposure

Image from a horizontal parabolic camera - 200ms exposure


Estimated
motion layer
Pixels within a black boundary are
pixels taken from images deblurred
with a single image

Deblurred image

Cropped from the image from a static camera

- 500ms exposure

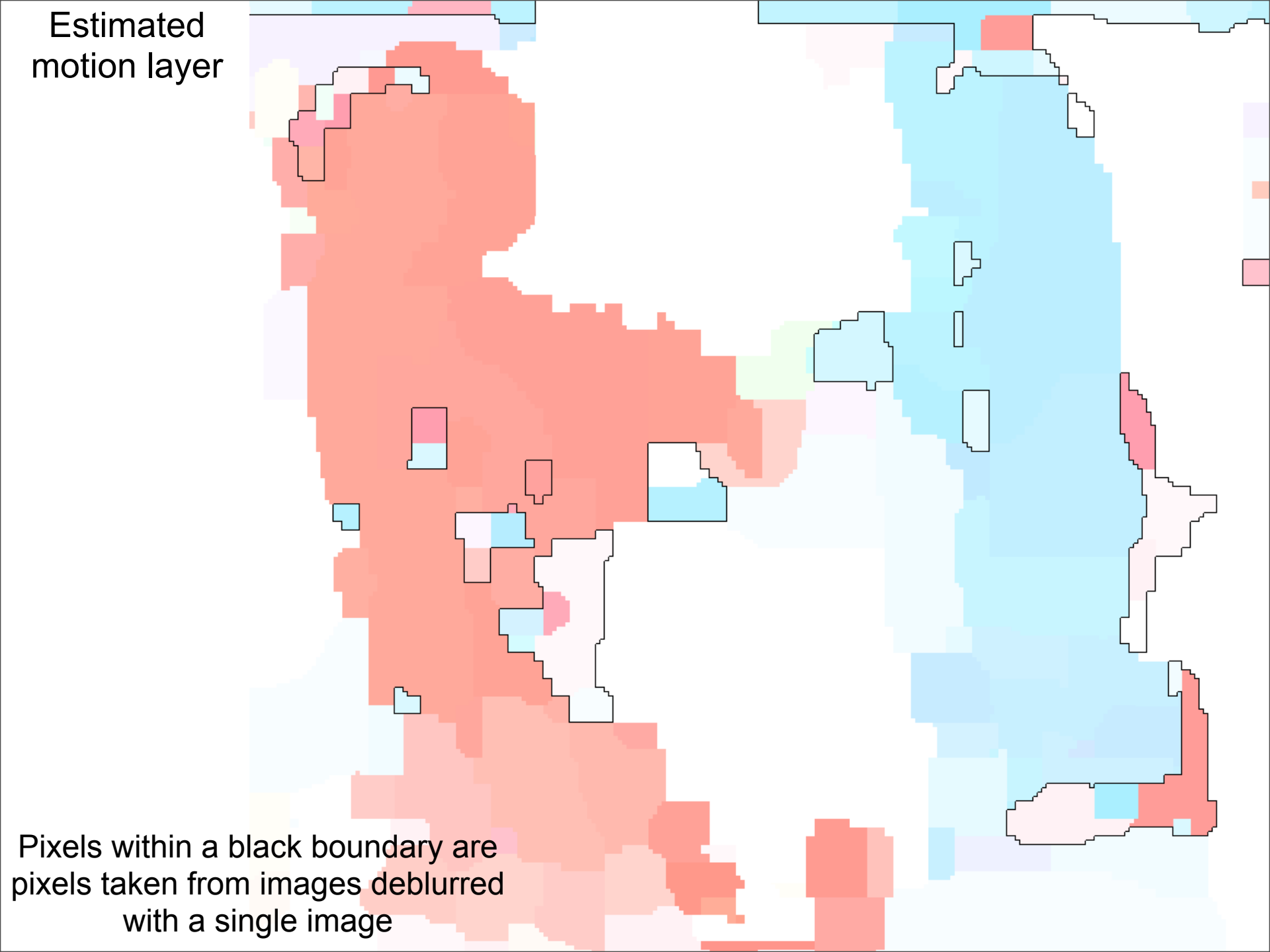
Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the deblurred image

Image from a static camera - 500ms exposure

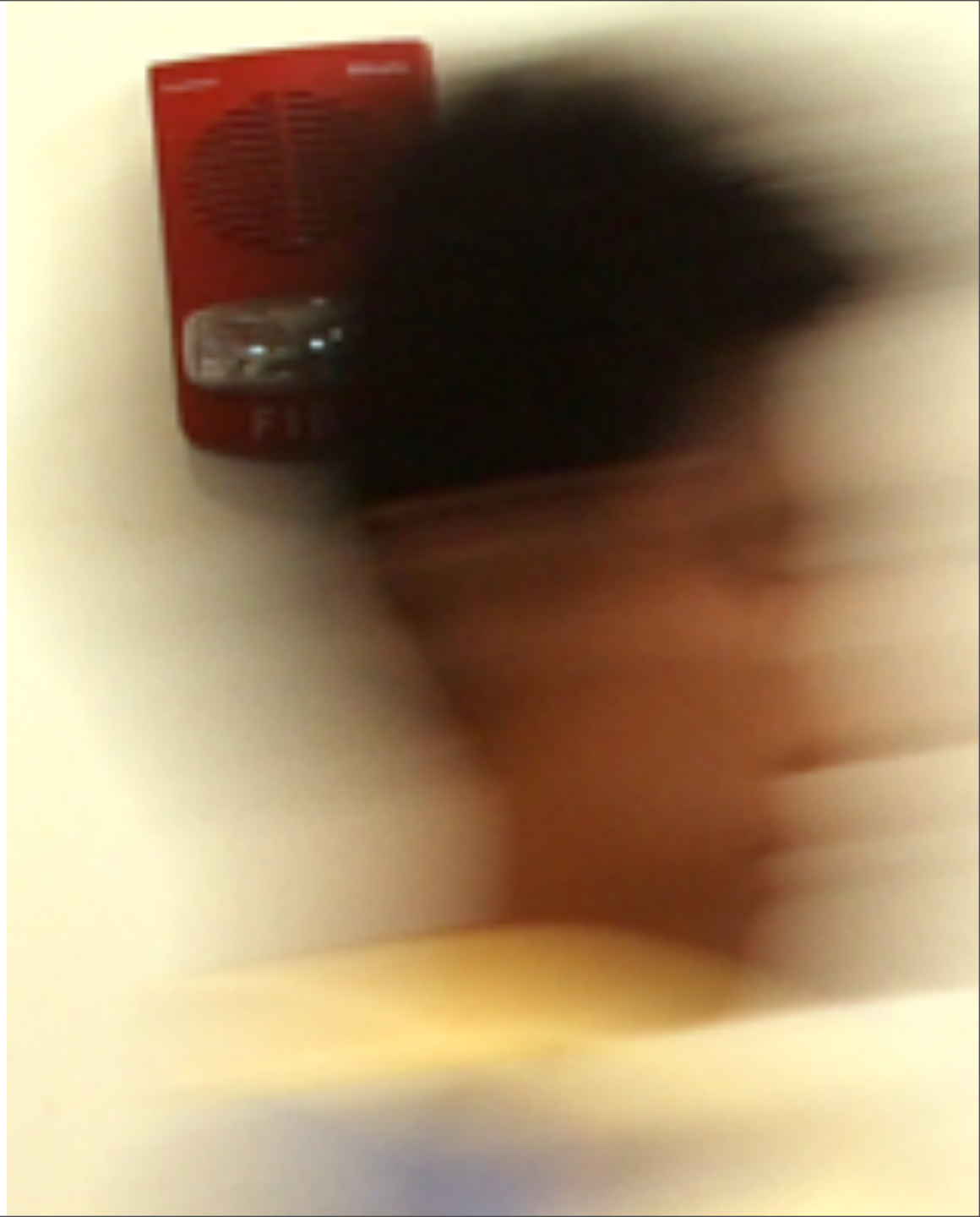
Image from a horizontal parabolic camera - 200ms exposure


Estimated
motion layer
Pixels within a black boundary are
pixels taken from images deblurred
with a single image

Deblurred image

Cropped from the image from a static camera

- 500ms exposure



Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the deblurred image

Image from a static camera - 500ms exposure

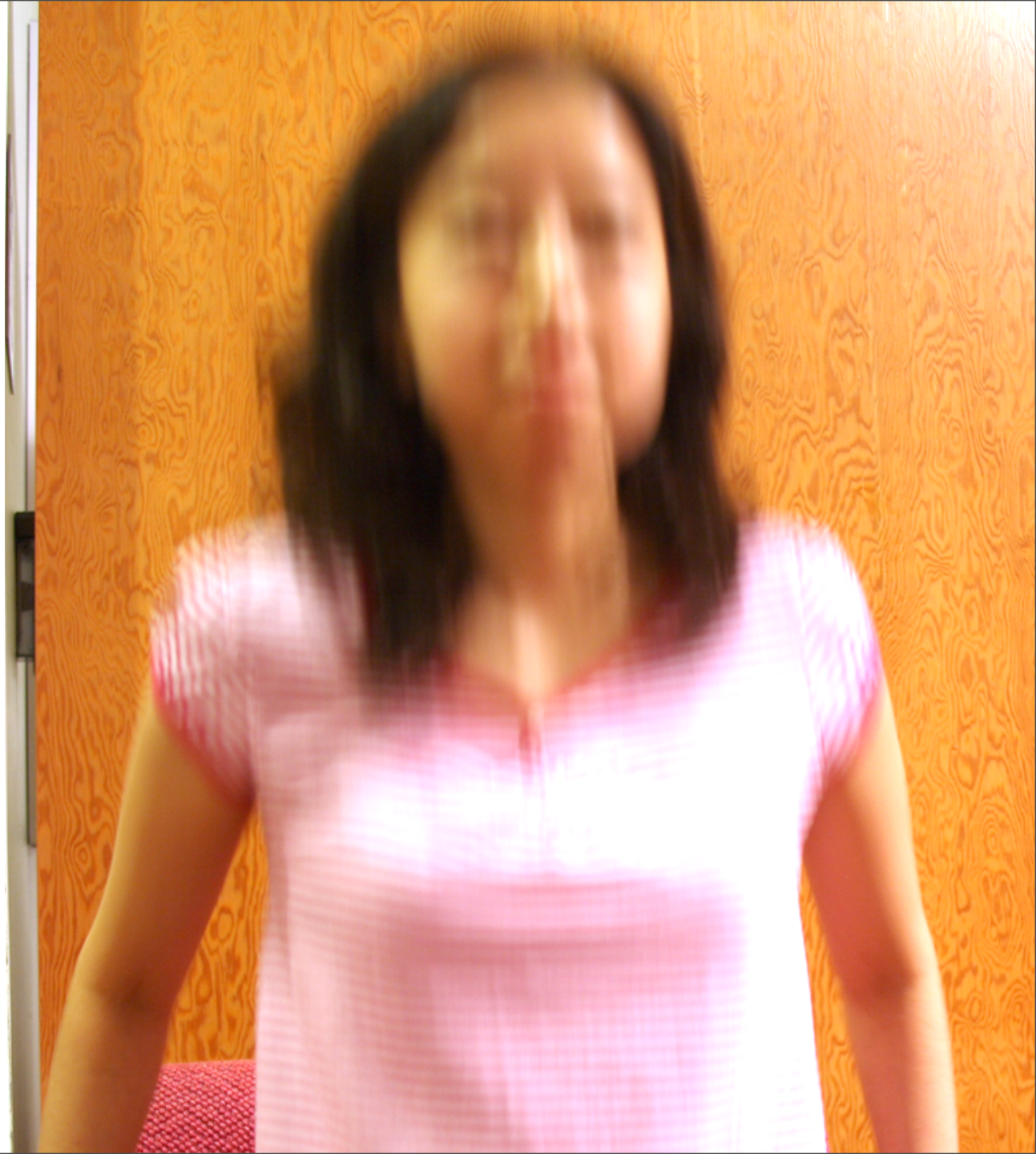
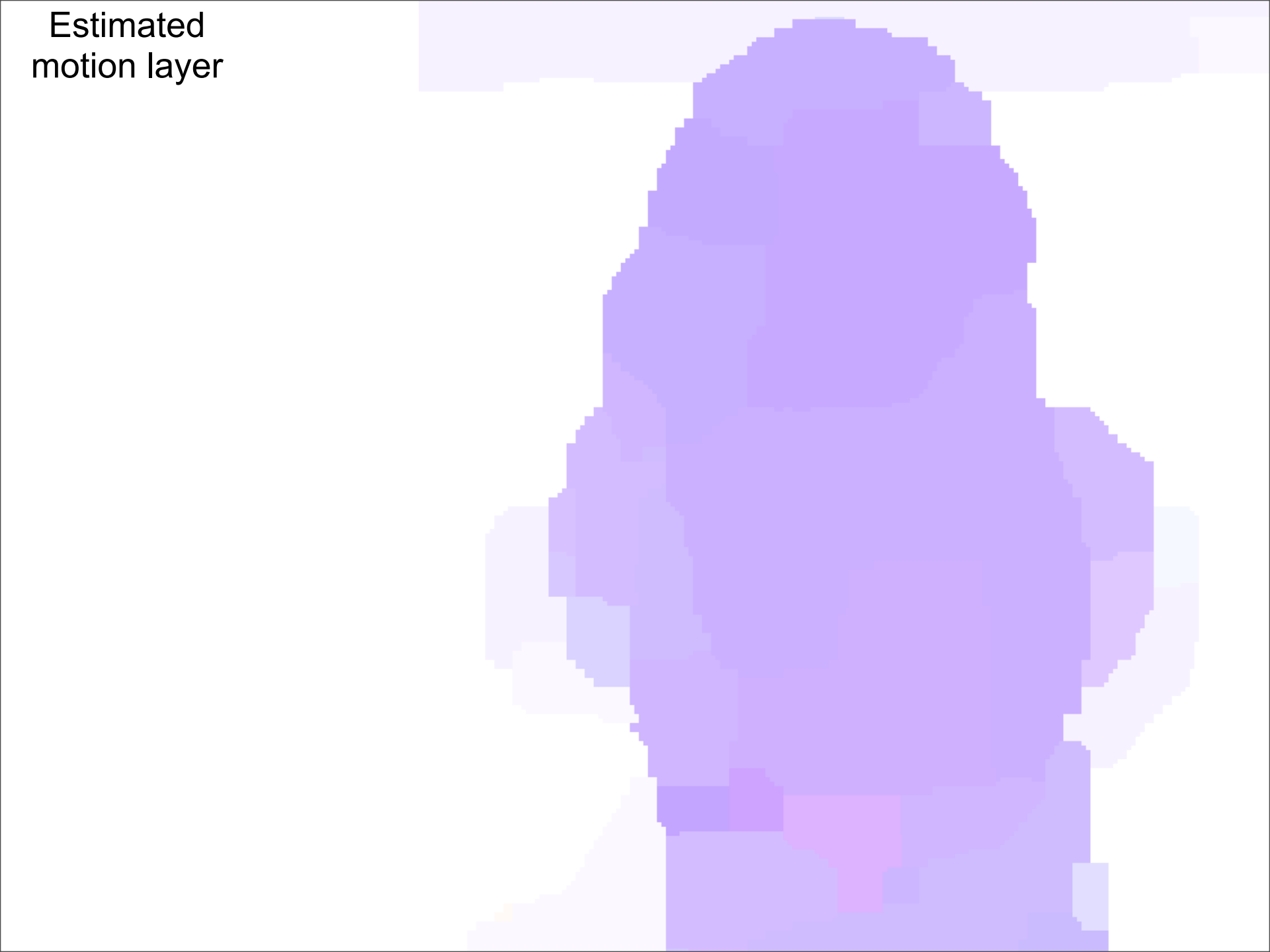


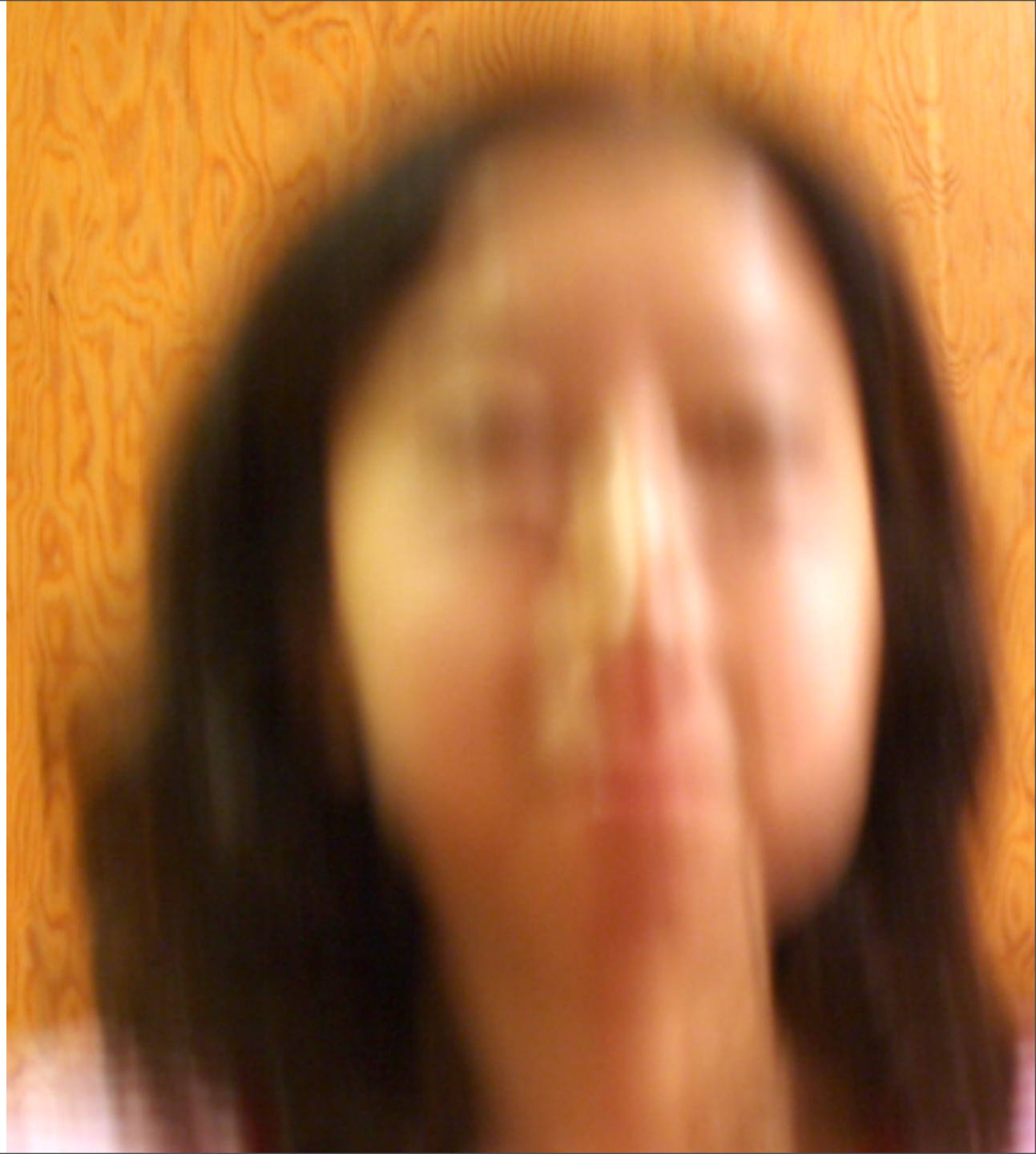
Image from a horizontal parabolic camera - 200ms exposure


Estimated
motion layer

Deblurred image

Cropped from the image from a static camera

- 500ms exposure



Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the deblurred image

Image from a static camera - 500ms exposure

Image from a horizontal parabolic camera - 200ms exposure

Estimated
motion layer

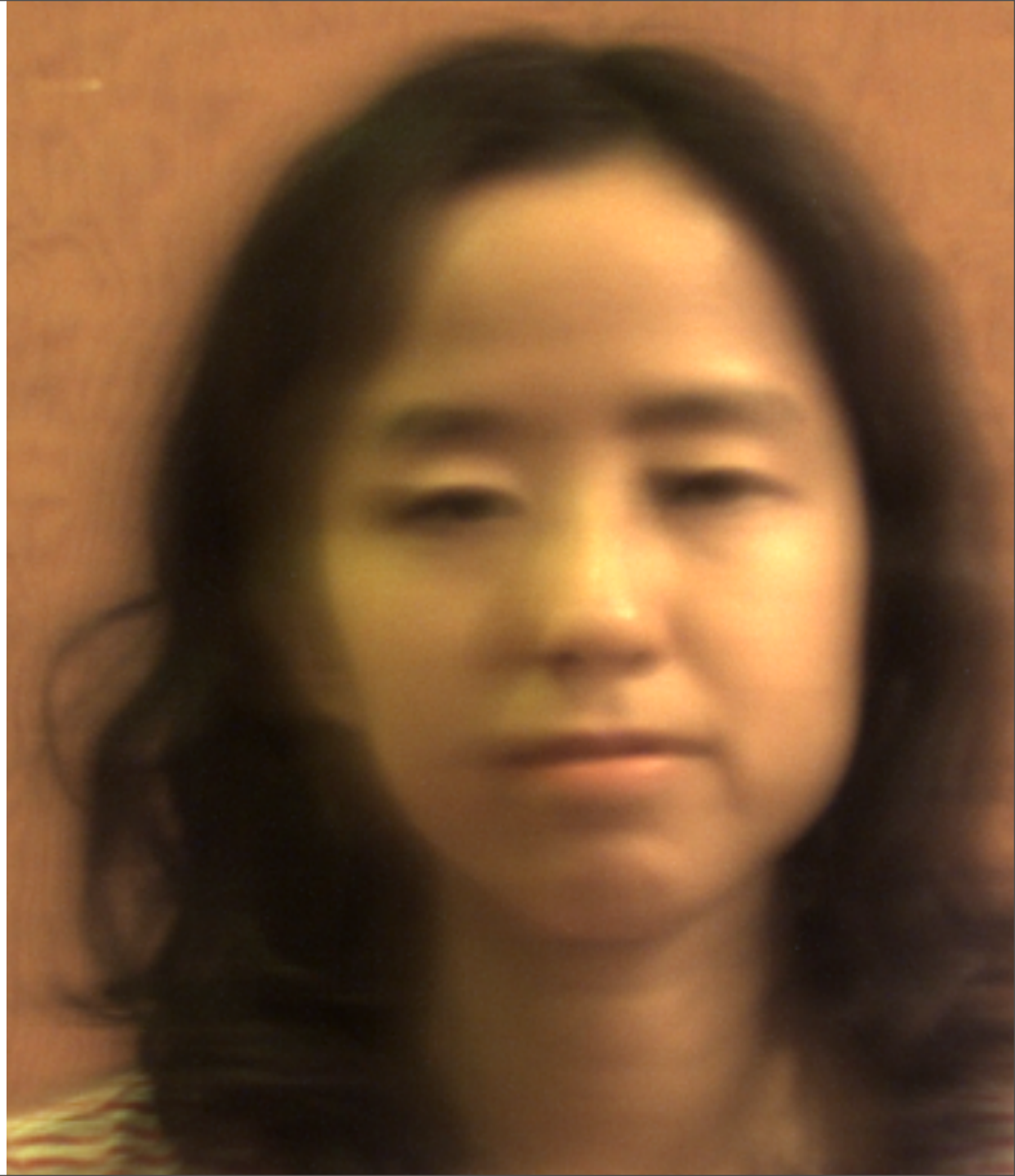
Deblurred image

Cropped from the image from a static camera

- 500ms exposure

Cropped from the image from a horizontal parabolic camera

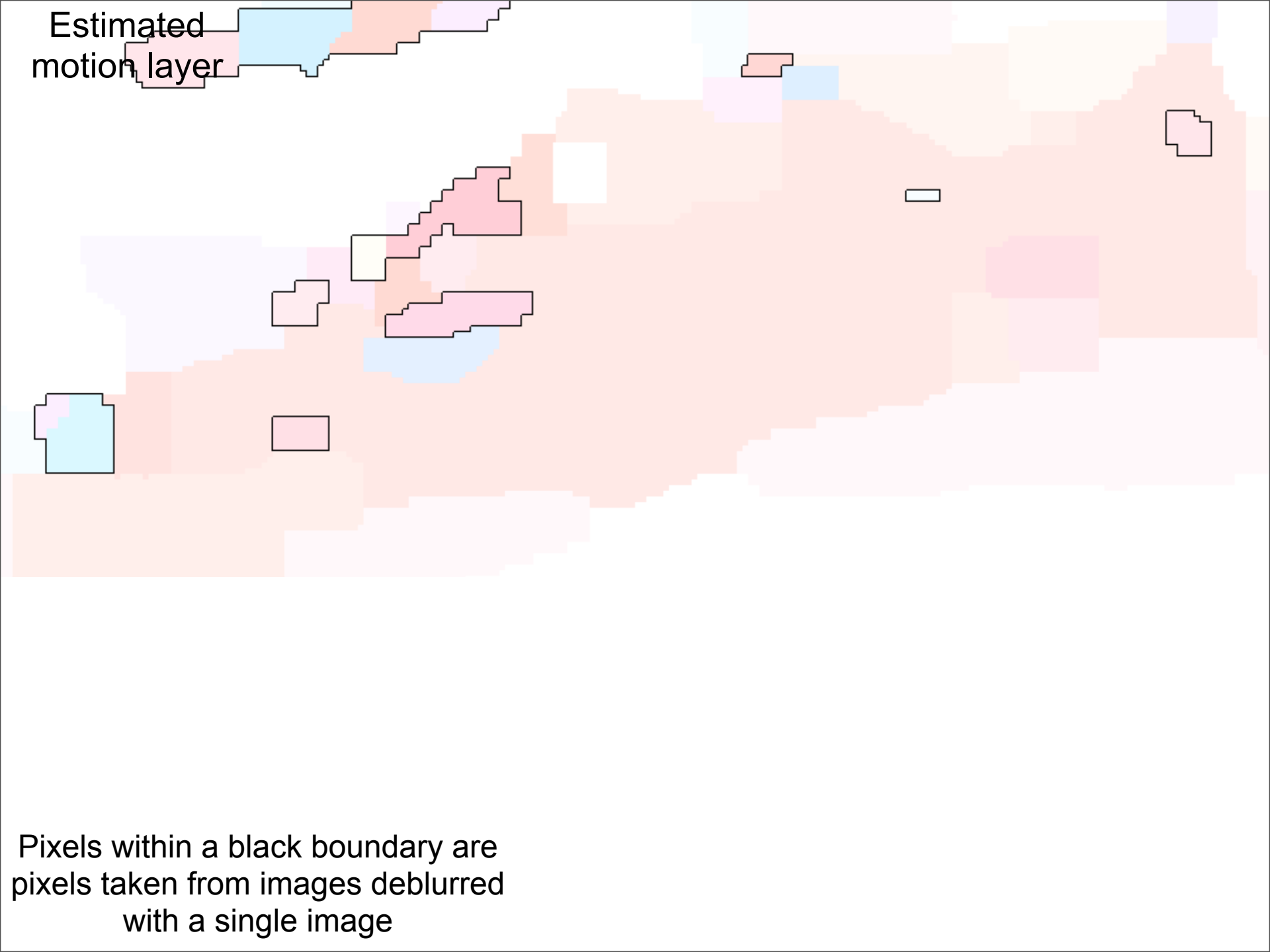
- 200ms exposure



Cropped from the deblurred image

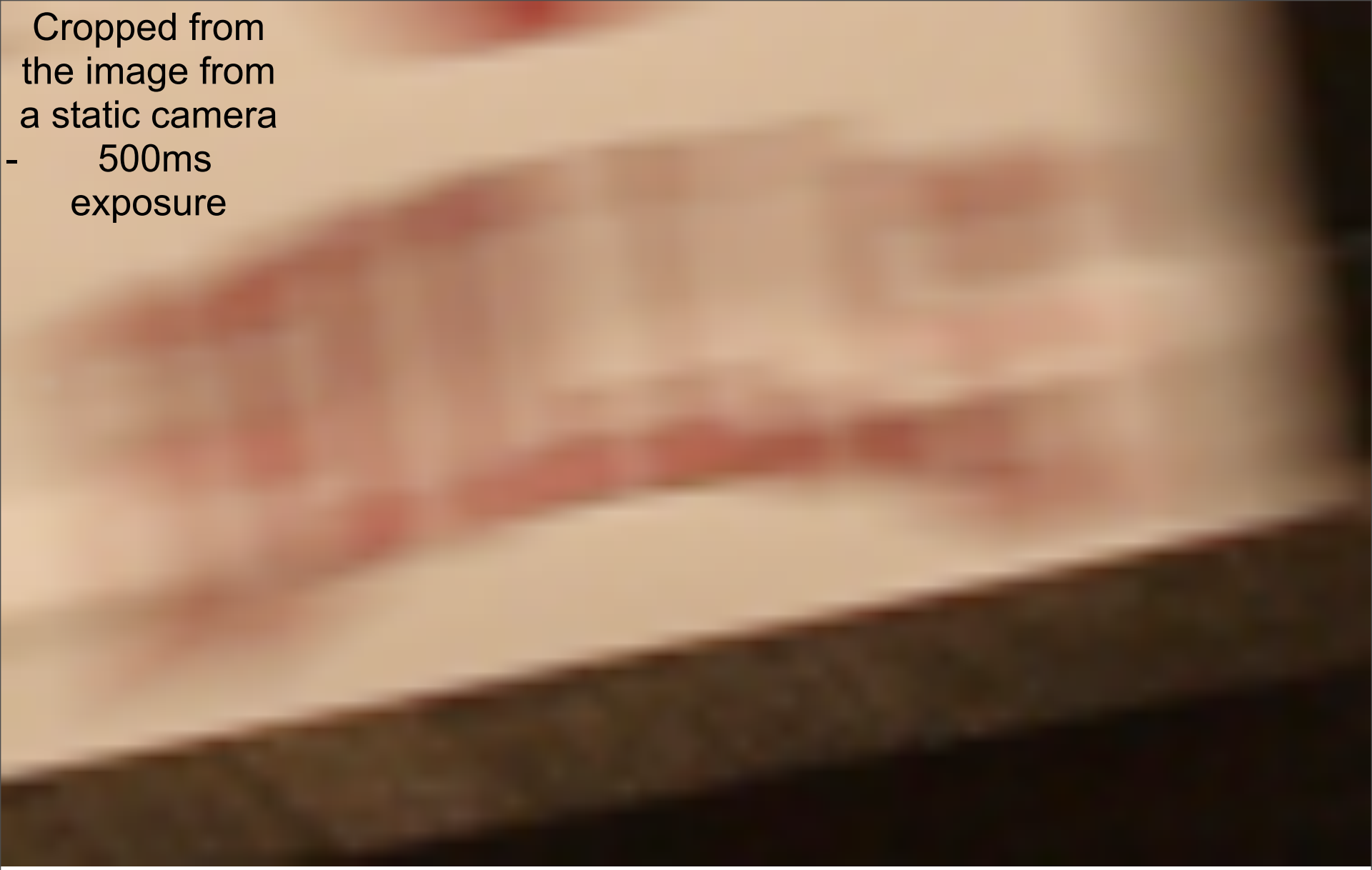

Image from a static camera - 500ms exposure
EXIT

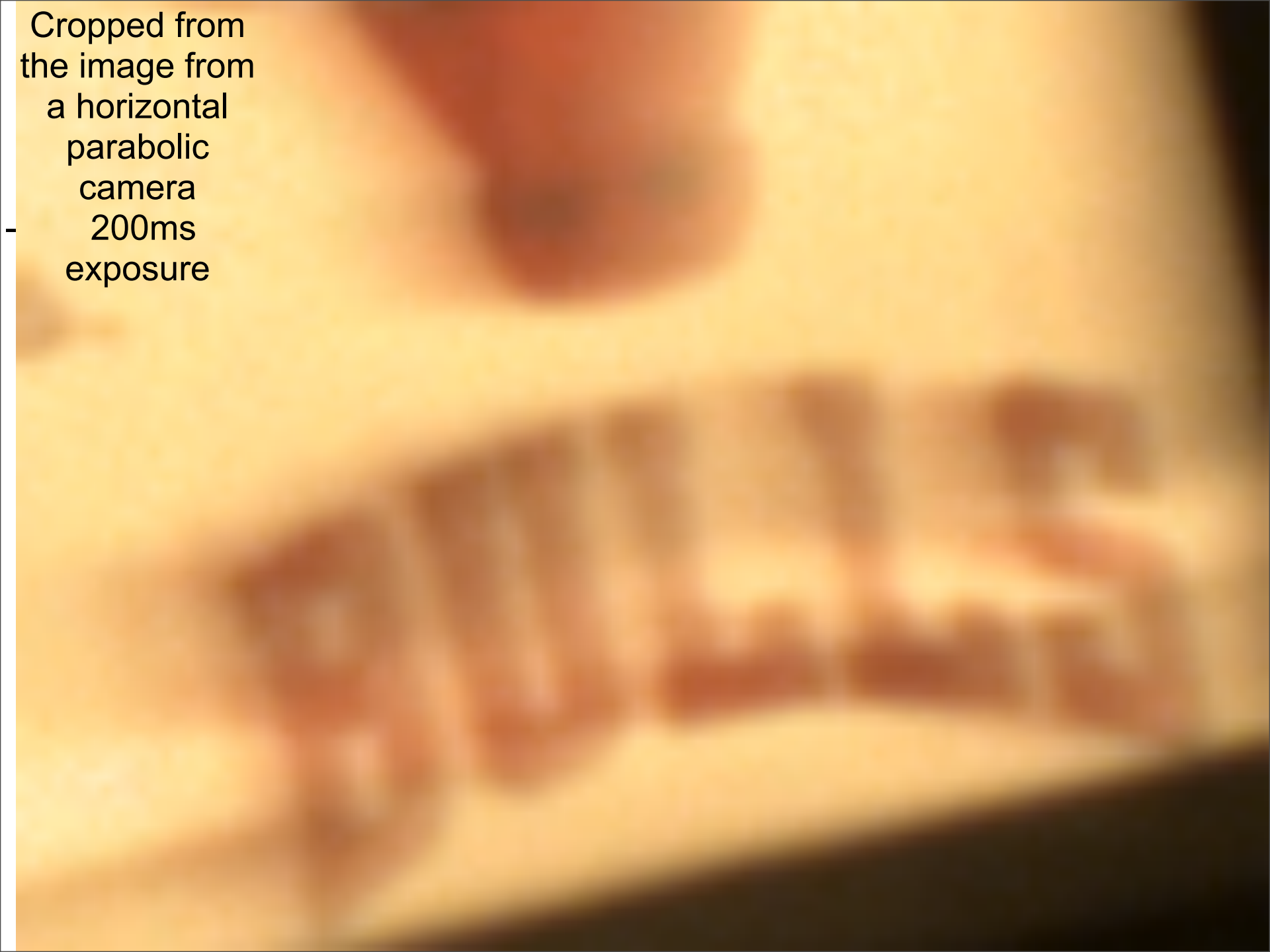

Image from a horizontal parabolic camera - 200ms exposure
CHICAGO
BULLS
vs.
BOSTON
CELTICS
BULLS



Pixels within a black boundary are pixels taken from images deblurred with a single image


Deblurred
image
CHICAGO
BULLS
vs.
BOSTON
CELTICS
BULLS


Cropped from the image from a static camera
- 500ms exposure

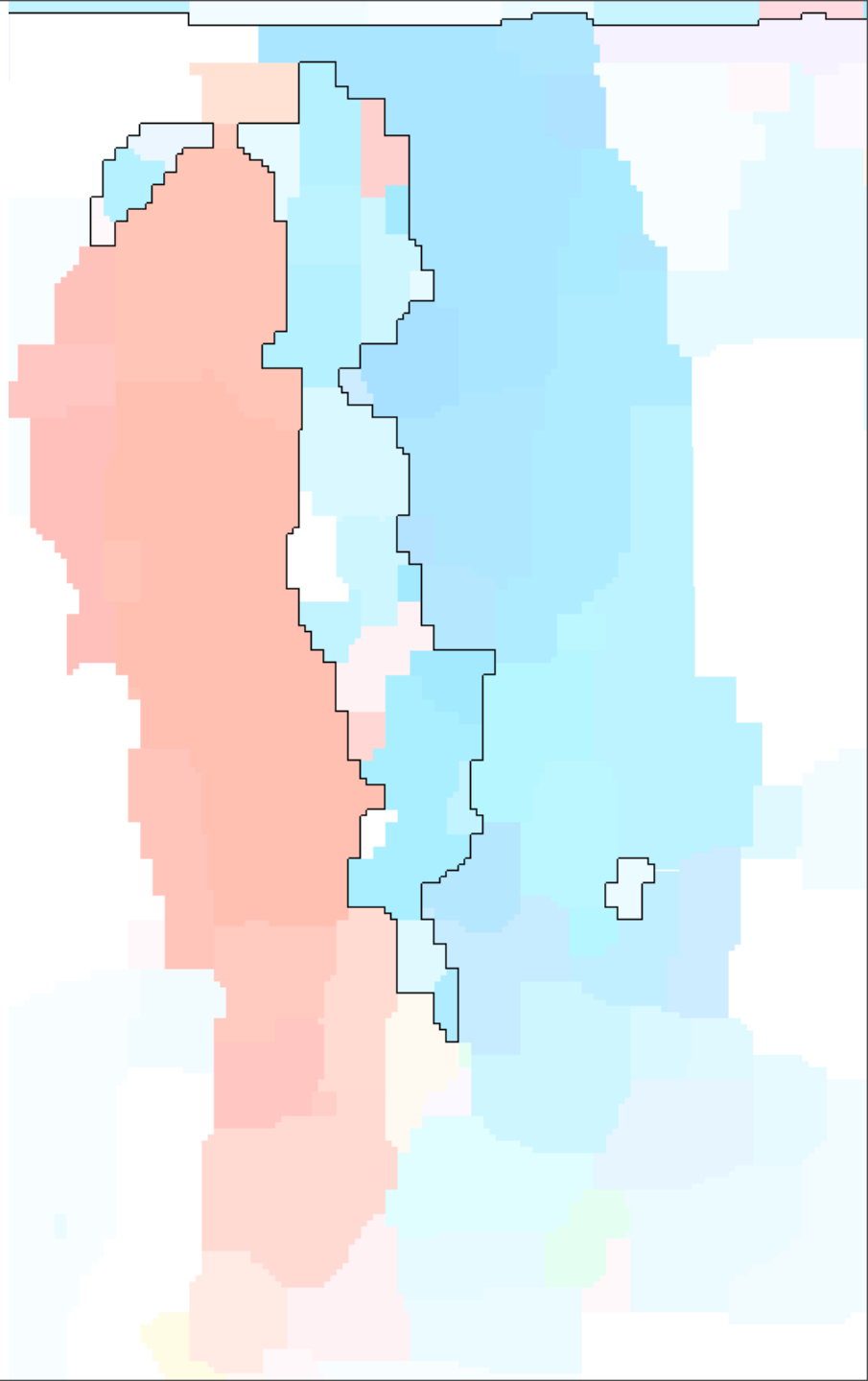

Cropped from the image from a horizontal parabolic camera 200ms exposure


Cropped from the deblurred image
BULLS

Image from a static camera - 500ms exposure

Image from a horizontal parabolic camera - 200ms exposure

Estimated motion layer



Pixels within a black boundary are pixels taken from images deblurred with a single image

Deblurred image

Cropped from the image from a static camera

- 500ms exposure

Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the deblurred image

Occlusion handling example

Image from a static camera
- 500ms exposure

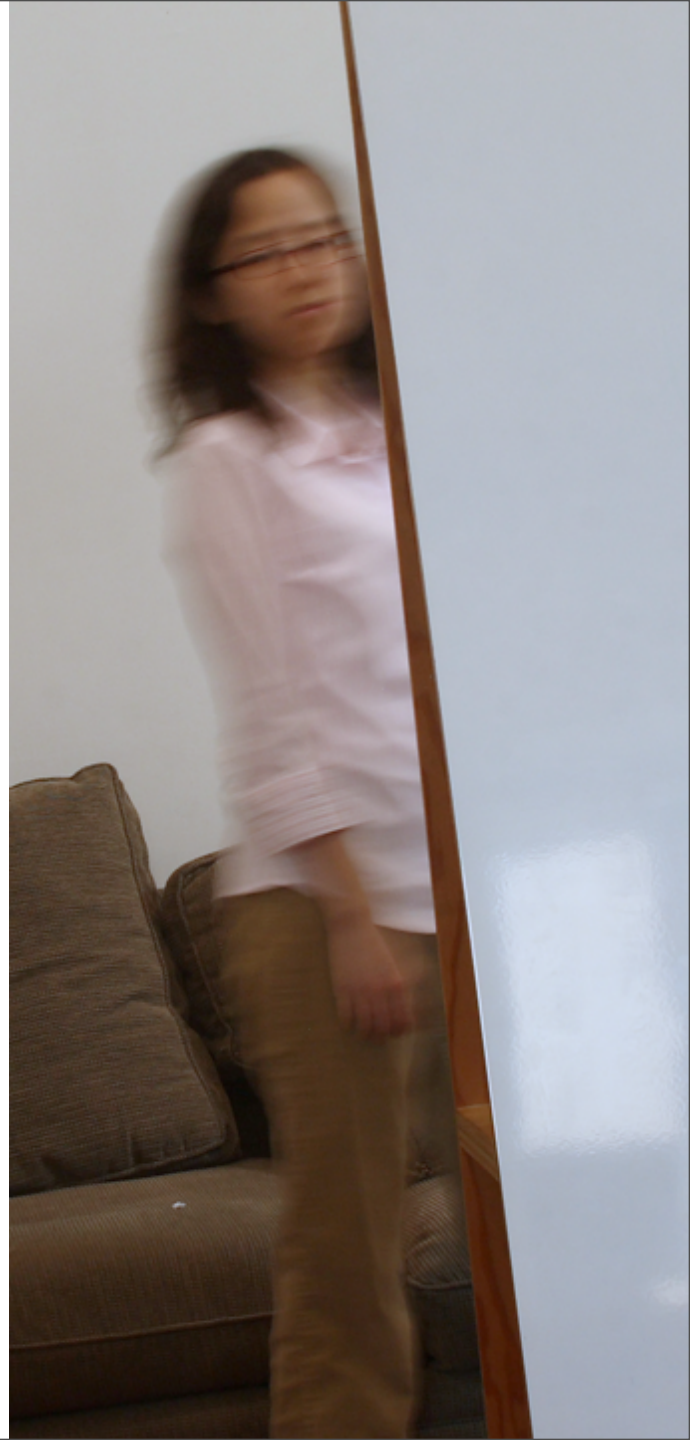


Image from a horizontal parabolic camera - 200ms exposure

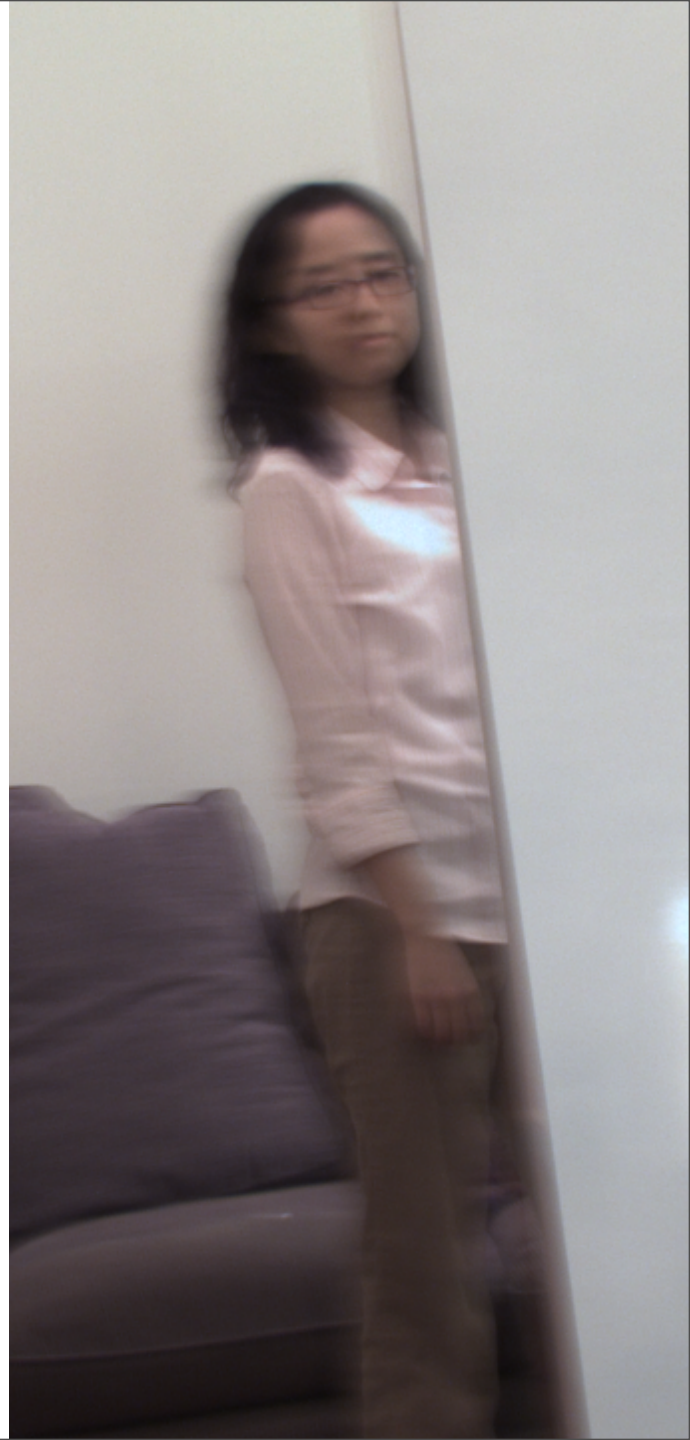
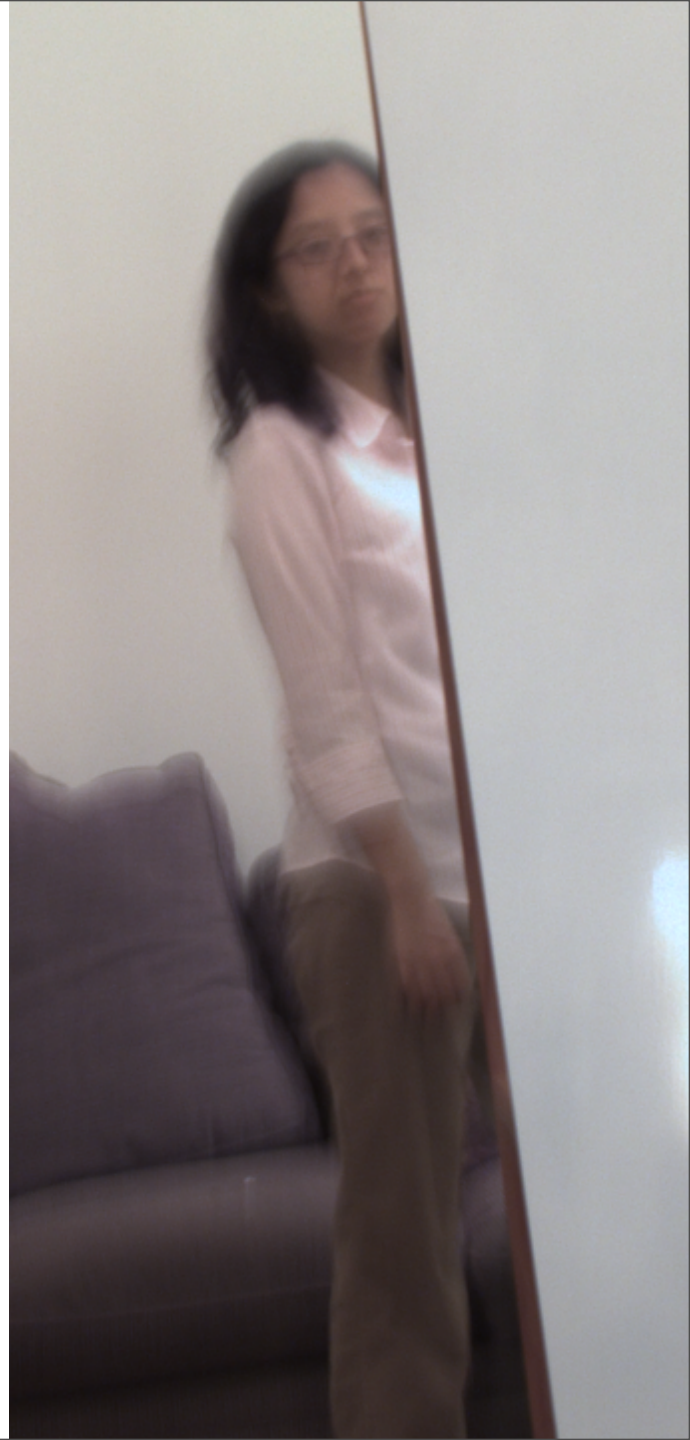
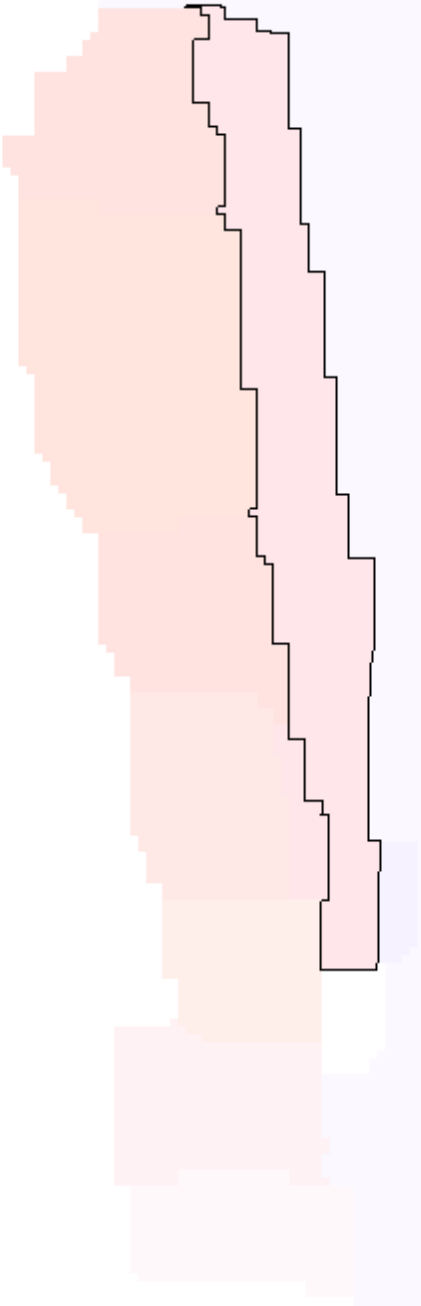


Image from a vertical parabolic camera - 200ms exposure



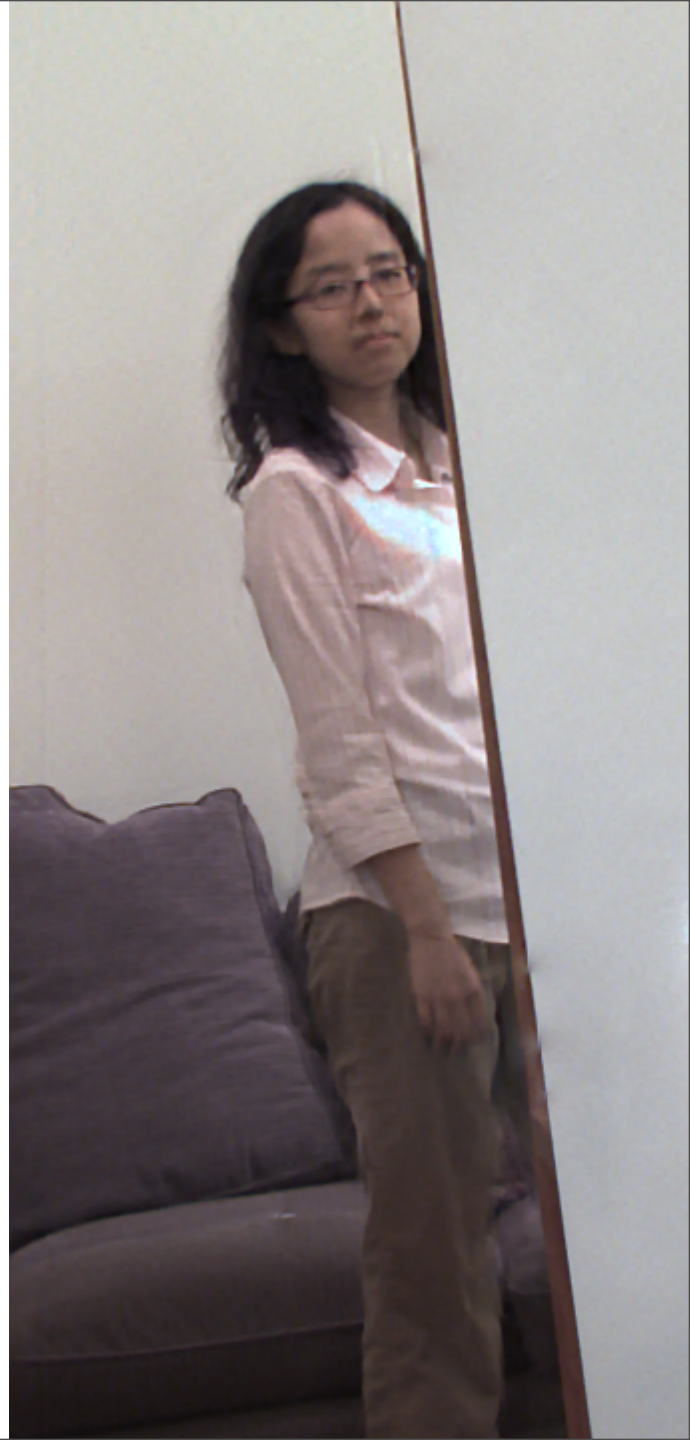
Estimated
motion layer



Pixels occluded in the second image are filled in from images deblurred with a single image

Pixels within a black boundary are pixels taken from images deblurred with a single image

Deblurred image



Cropped from the image from a static camera

- 500ms exposure

Cropped from the image from a horizontal parabolic camera

- 200ms exposure

Cropped from the image from a vertical parabolic camera

- 200ms exposure

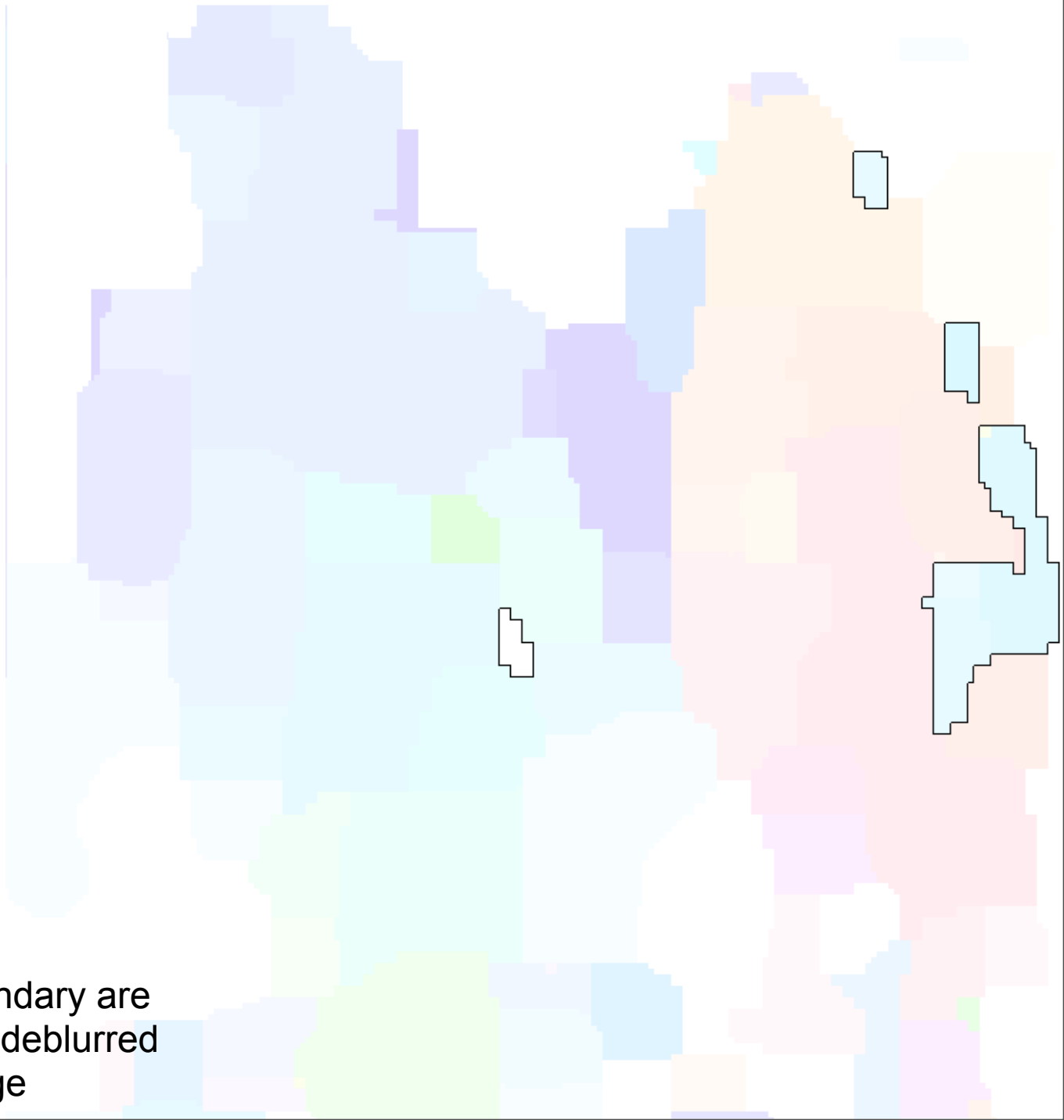
Cropped from the deblurred image

Forward object motion deblurring examples

Image from a static camera - 500ms exposure

Image from a horizontal parabolic camera - 200ms exposure

Estimated motion layer



Pixels within a black boundary are pixels taken from images deblurred with a single image

Deblurred image

Cropped from the image from a static camera - 500ms exposure

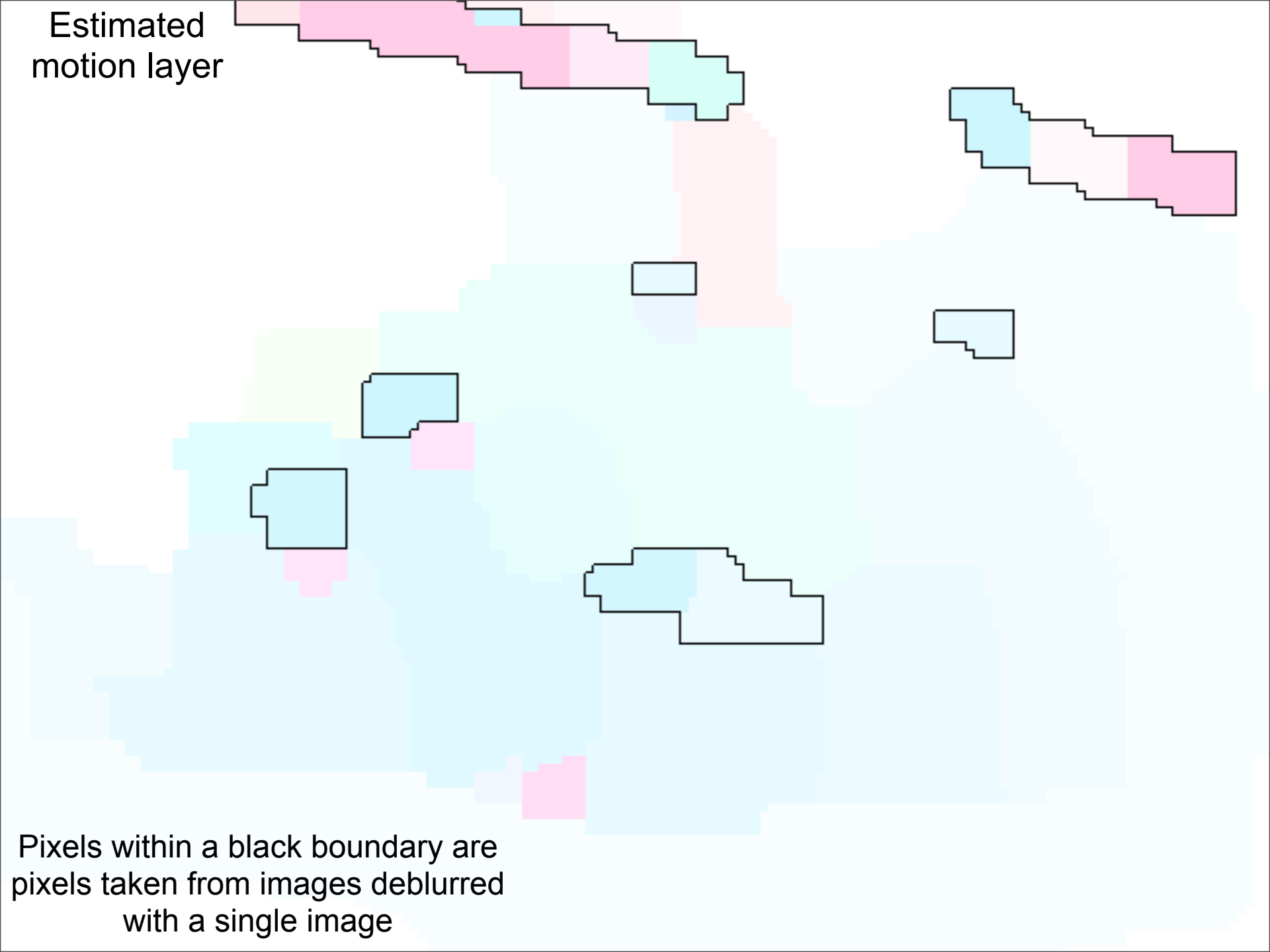
Cropped from the image from a horizontal parabolic camera

- 200ms exposure

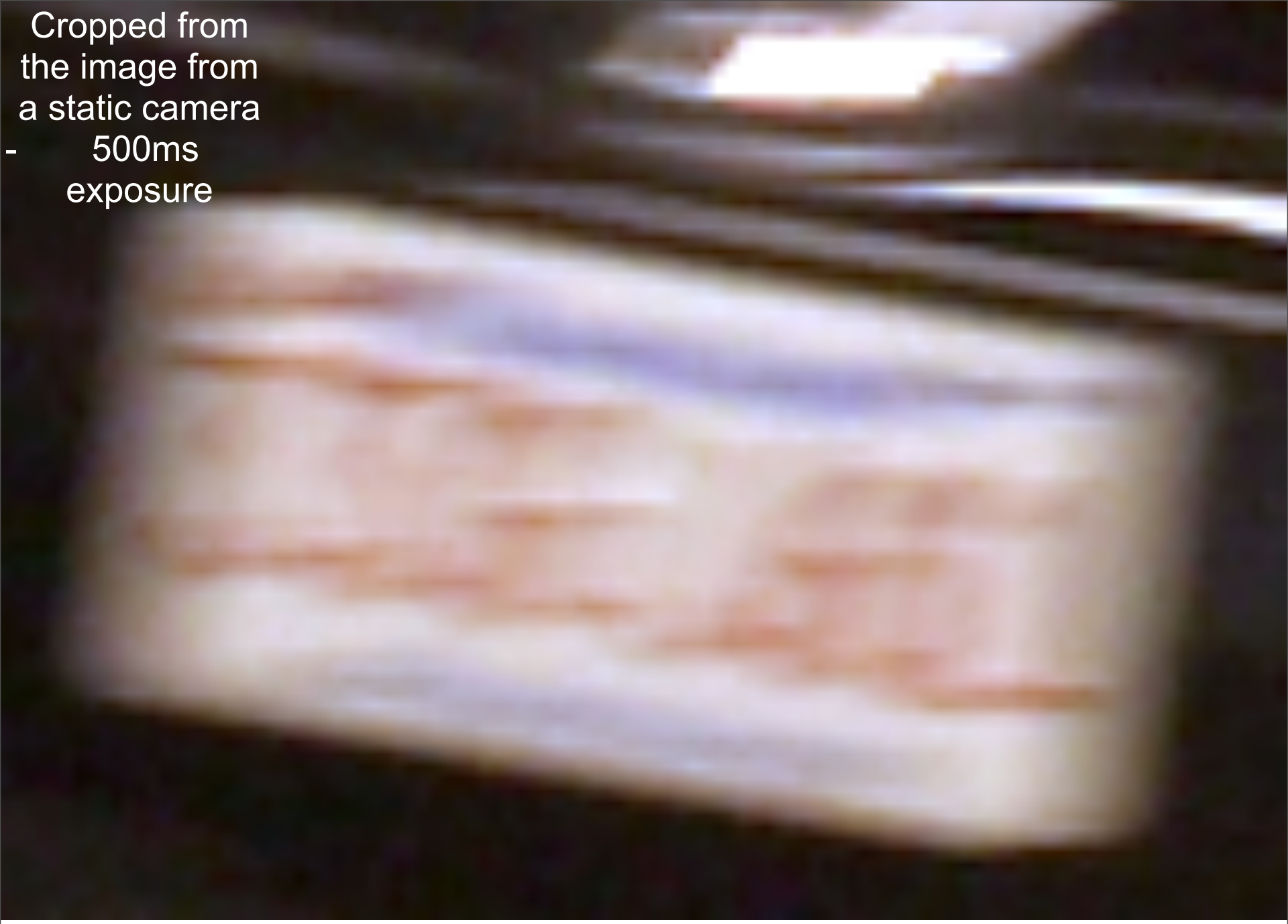
Cropped from the deblurred image

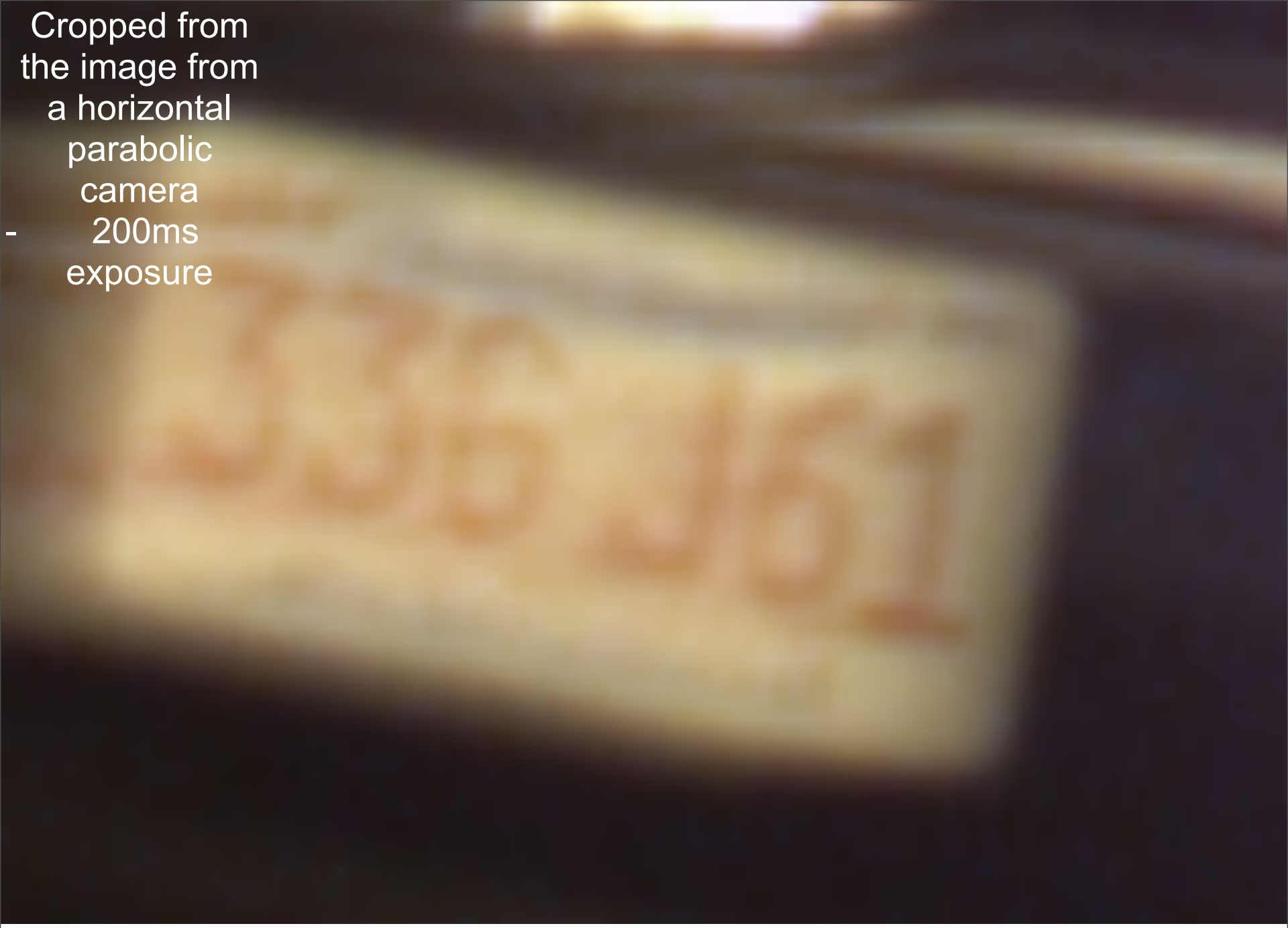

Image from
a static camera
- 500ms
exposure
EXIT
EXIT


Image from a horizontal parabolic camera - 200ms exposure


Estimated
motion layer
Pixels within a black boundary are
pixels taken from images deblurred
with a single image


Deblurred
image
336 J61


Cropped from the image from a static camera
- 500ms exposure


Cropped from the image from a horizontal parabolic camera
- 200ms exposure


Cropped from the deblurred image
336 J61