Computational Photography

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Fall 2014
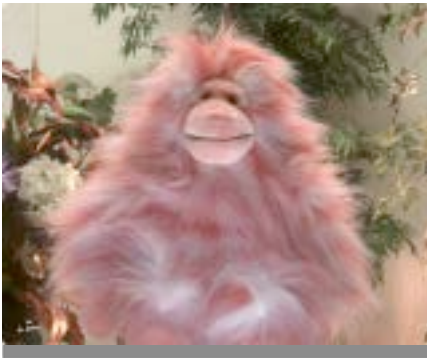
Project 6

- Light Fields
- Ray Space Analysis
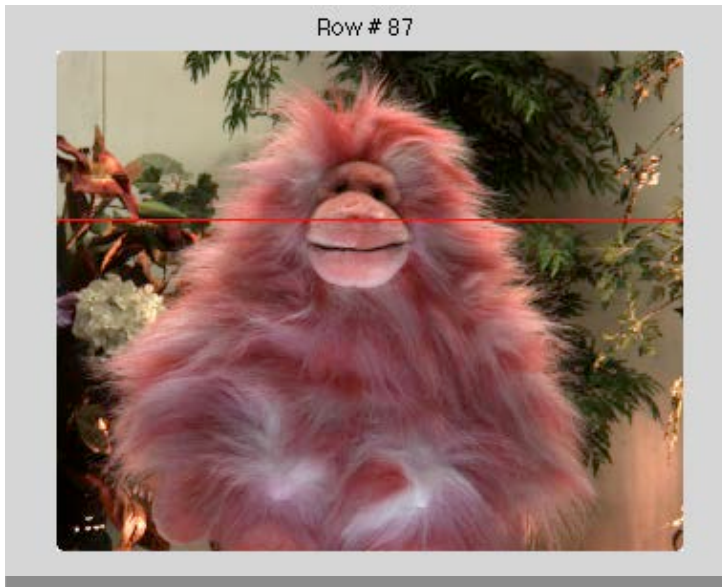- View Reconstruction
- Autostereoscopic image

Assignment 1

- Get light field data: http://graphics.ucsd.edu/datasets/lfarchive/lfs.shtml

Assignment 1

- Visualize ray space
- Analyze images

Camera view
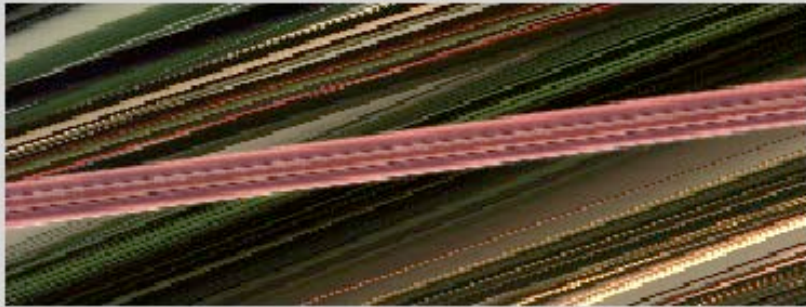

Ray space,
"epipolar plane image", EPI

Assignment 1

- Visualize power spectrum in Fourier space
- Analyze images

EPI
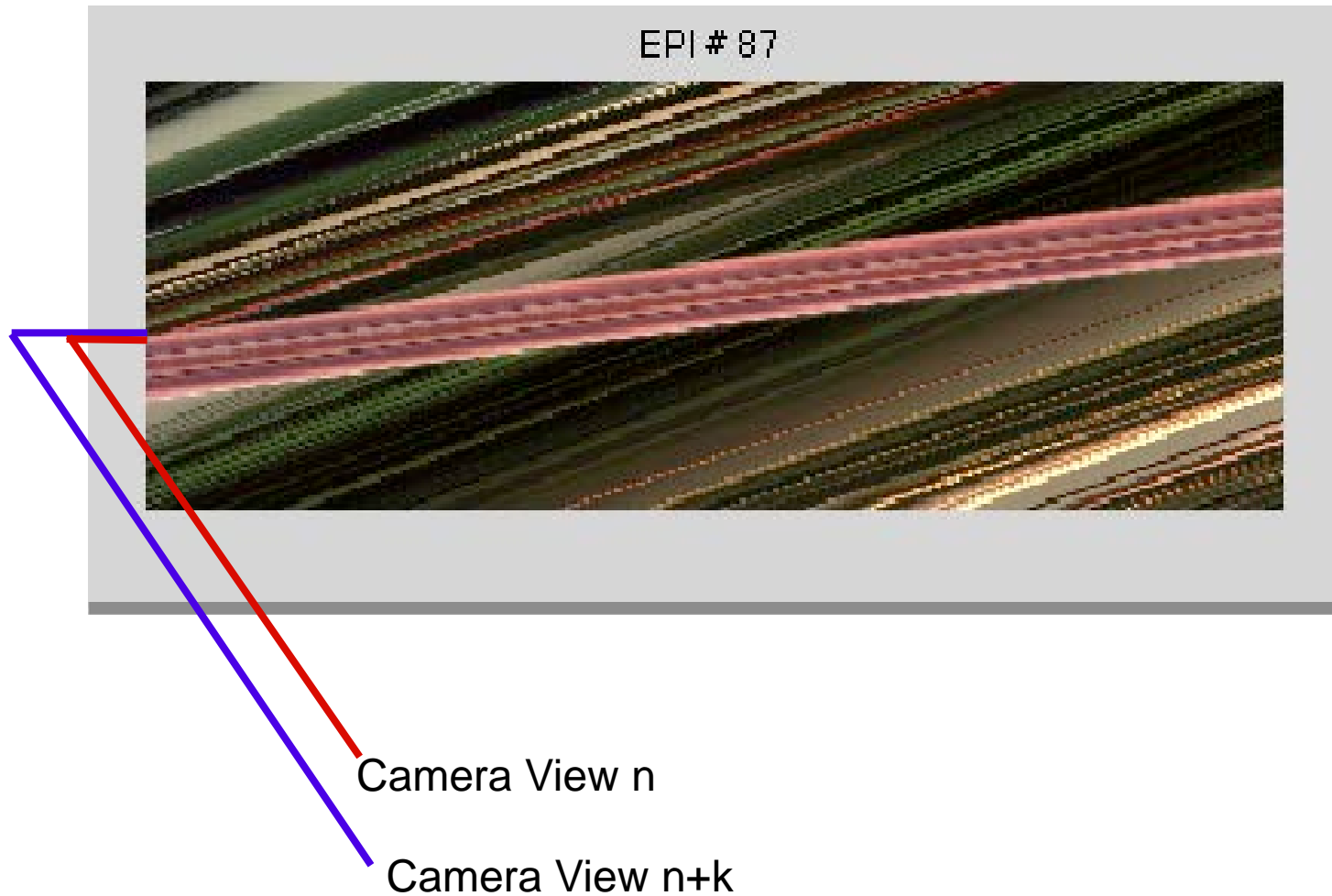

Fourier space

Assignment 2

- Linear interpolation in ray space

EPI # 87
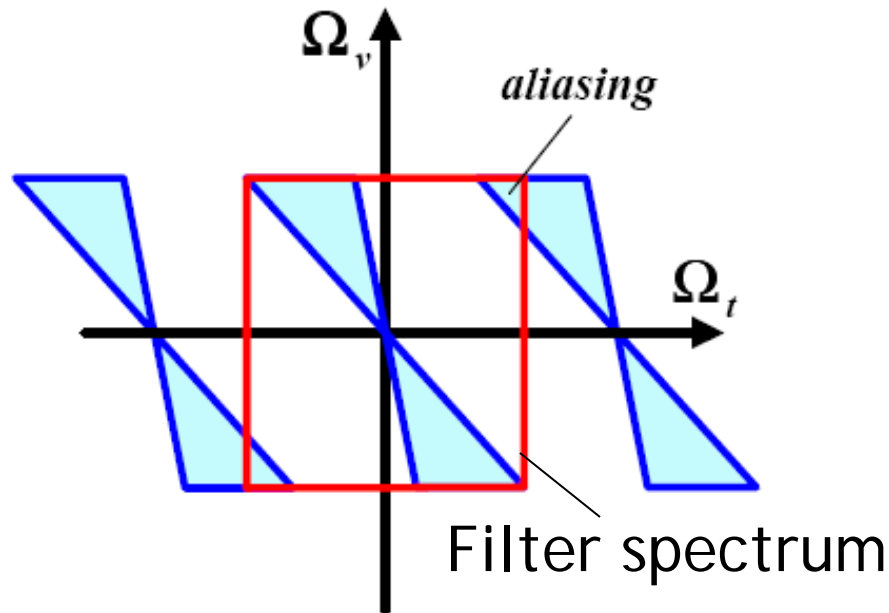
Camera View n

Camera View n+k
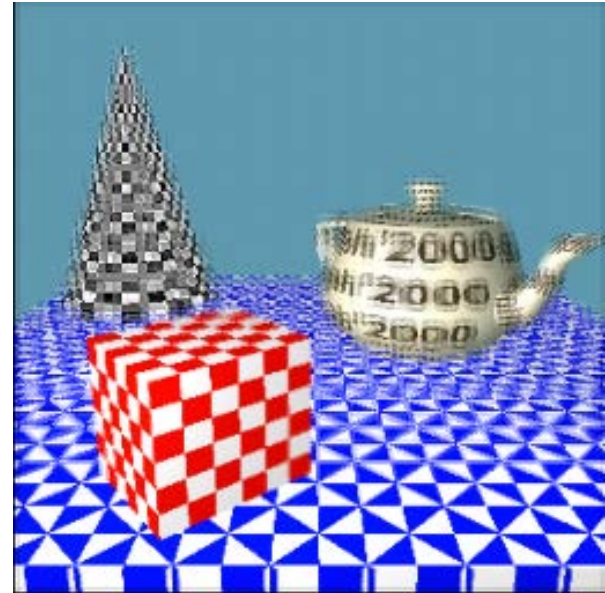
Linear Interpolation, k=2

linear interpolated image

Remember:

- Sampling leads to replication of spectra
- Reconstruction is multiplication with filter spectrum
- Overlap with non-central replicas is aliasing
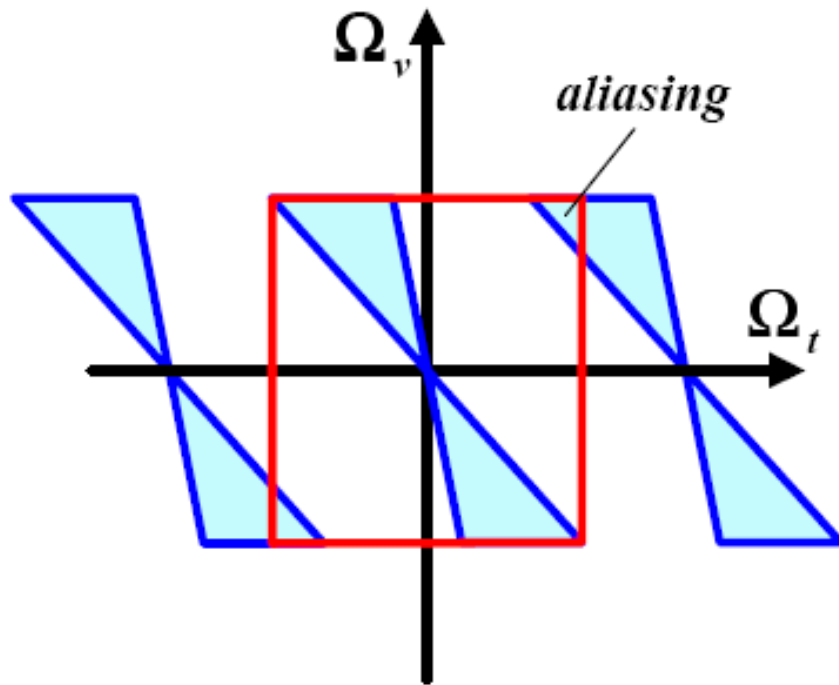

Reconstruction with
aliasing

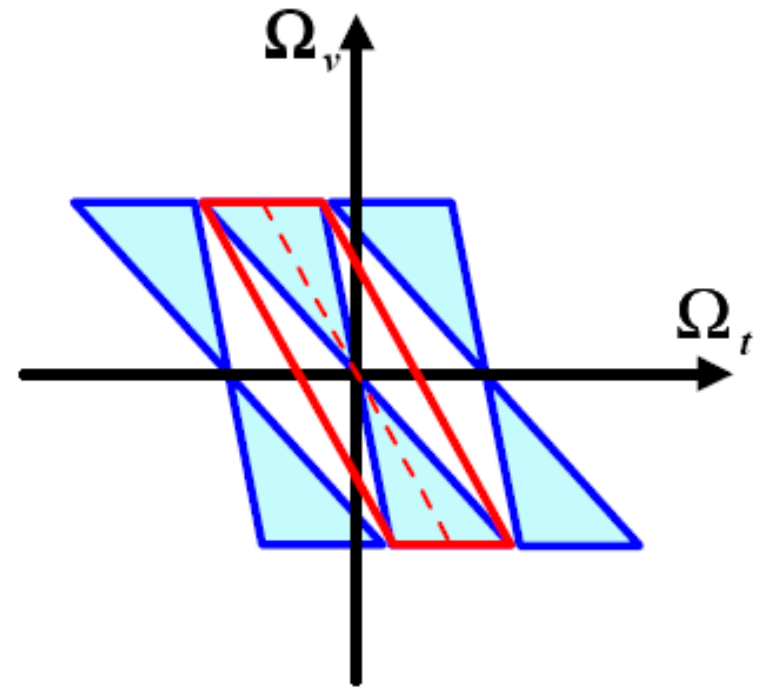Aliasing appears as
double edges

Remember:

• **Sheared** reconstruction filter to match depth of scene allows lower sampling rate

Higher sampling rate
isotropic reconstruction filter,
aliasing

Lower sampling rate,
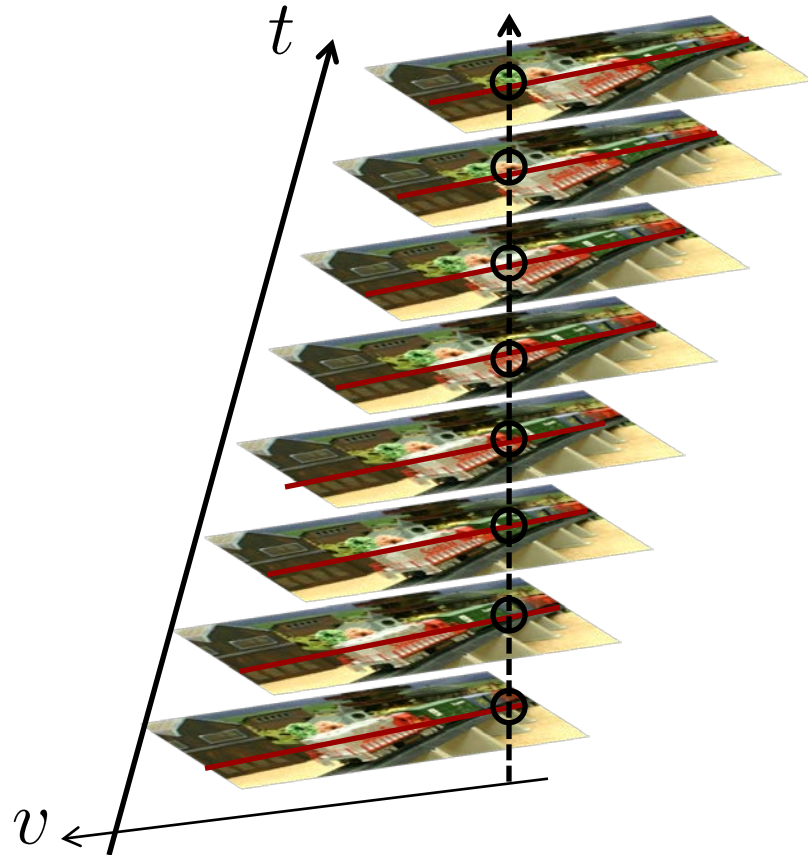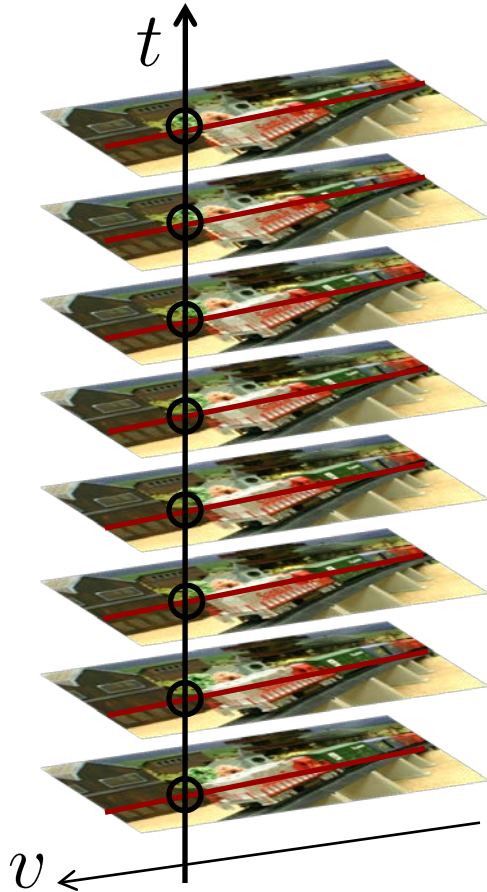optimal reconstruction filter,
no aliasing

Remember:

- Shearing reconstruction filter equivalent to shearing signal before filtering
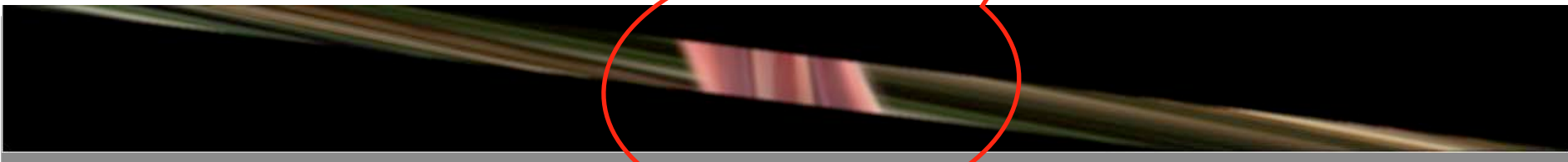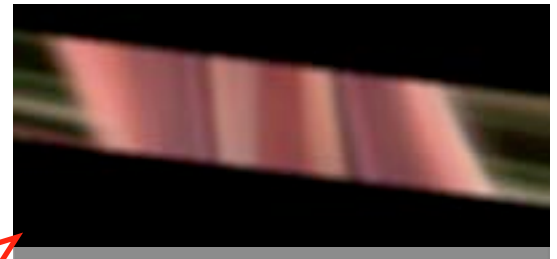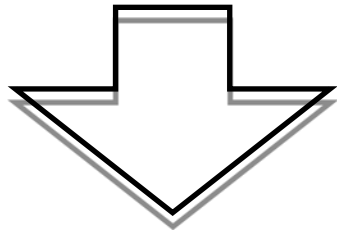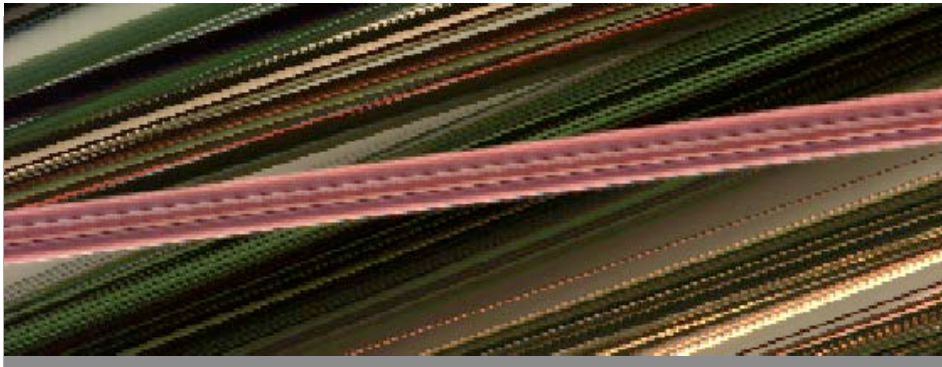
Remember:

- Input

- Reconstruction: filtering across images

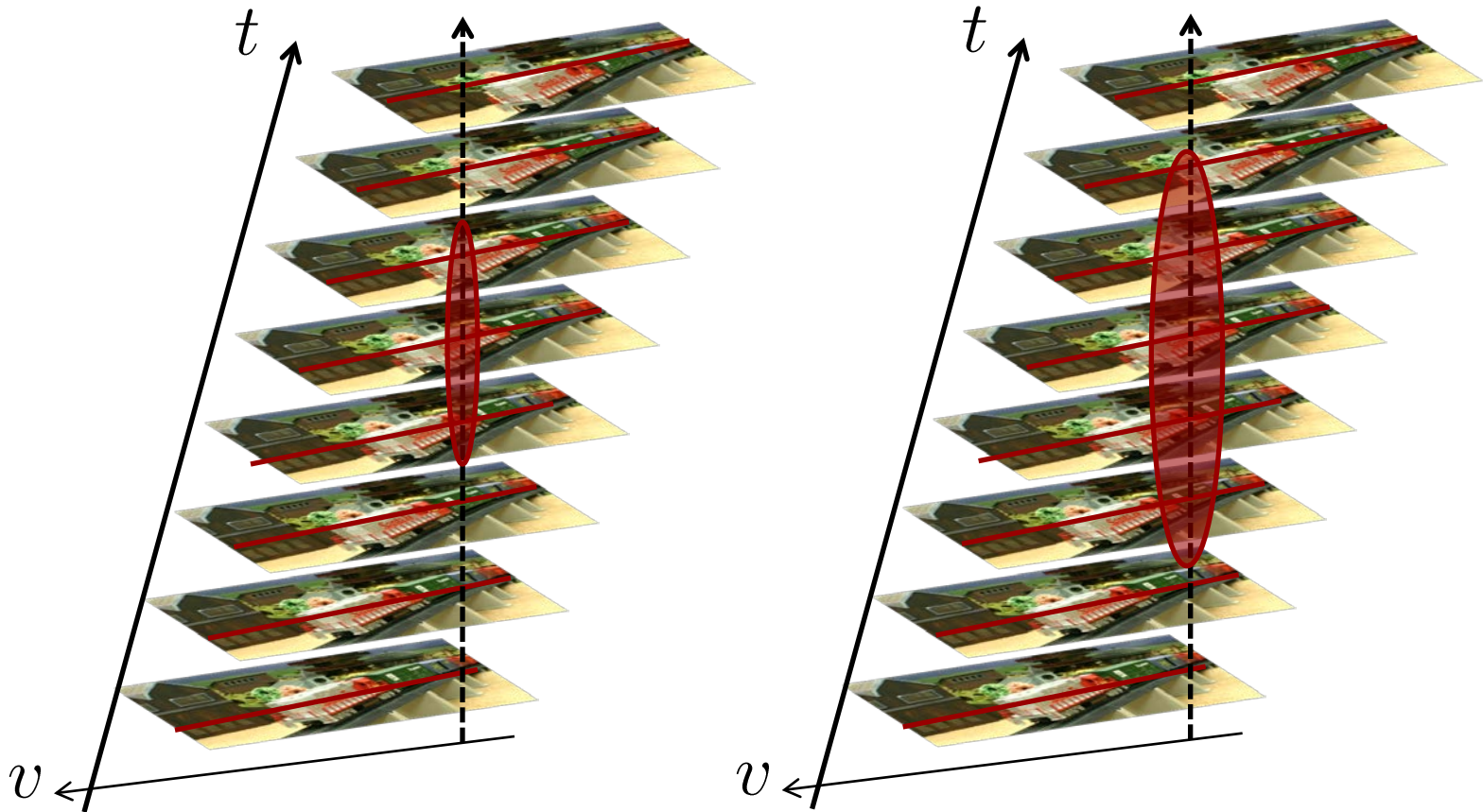 - Shear determines which depth is aligned with filter

Assignment 2

- Shearing in Ray Space: Shear EPIs

- Determine shearing angle in EPIs

Assignment 2

- Filter EPIs with gaussian Filter
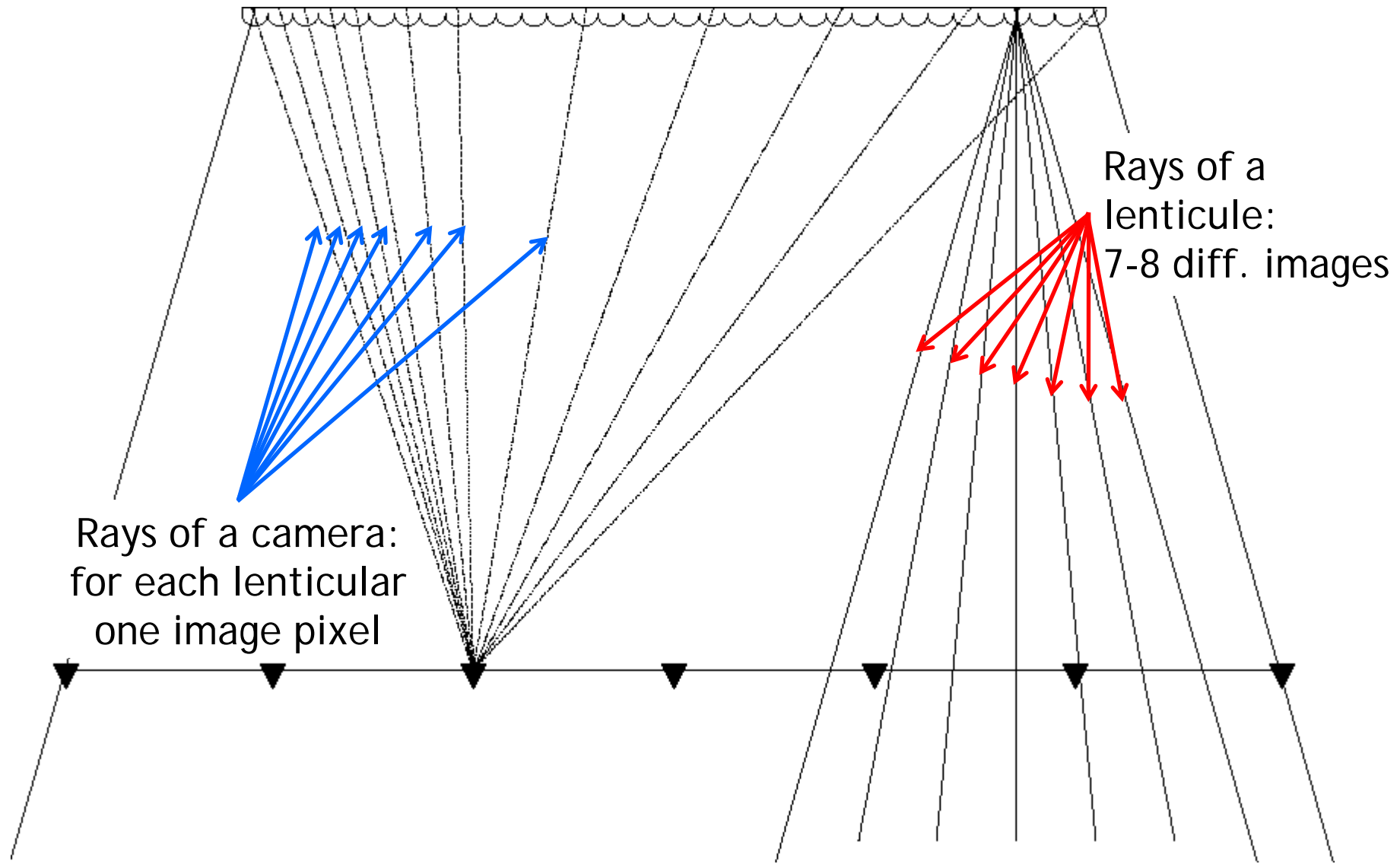
Linear Interpolation, k=2
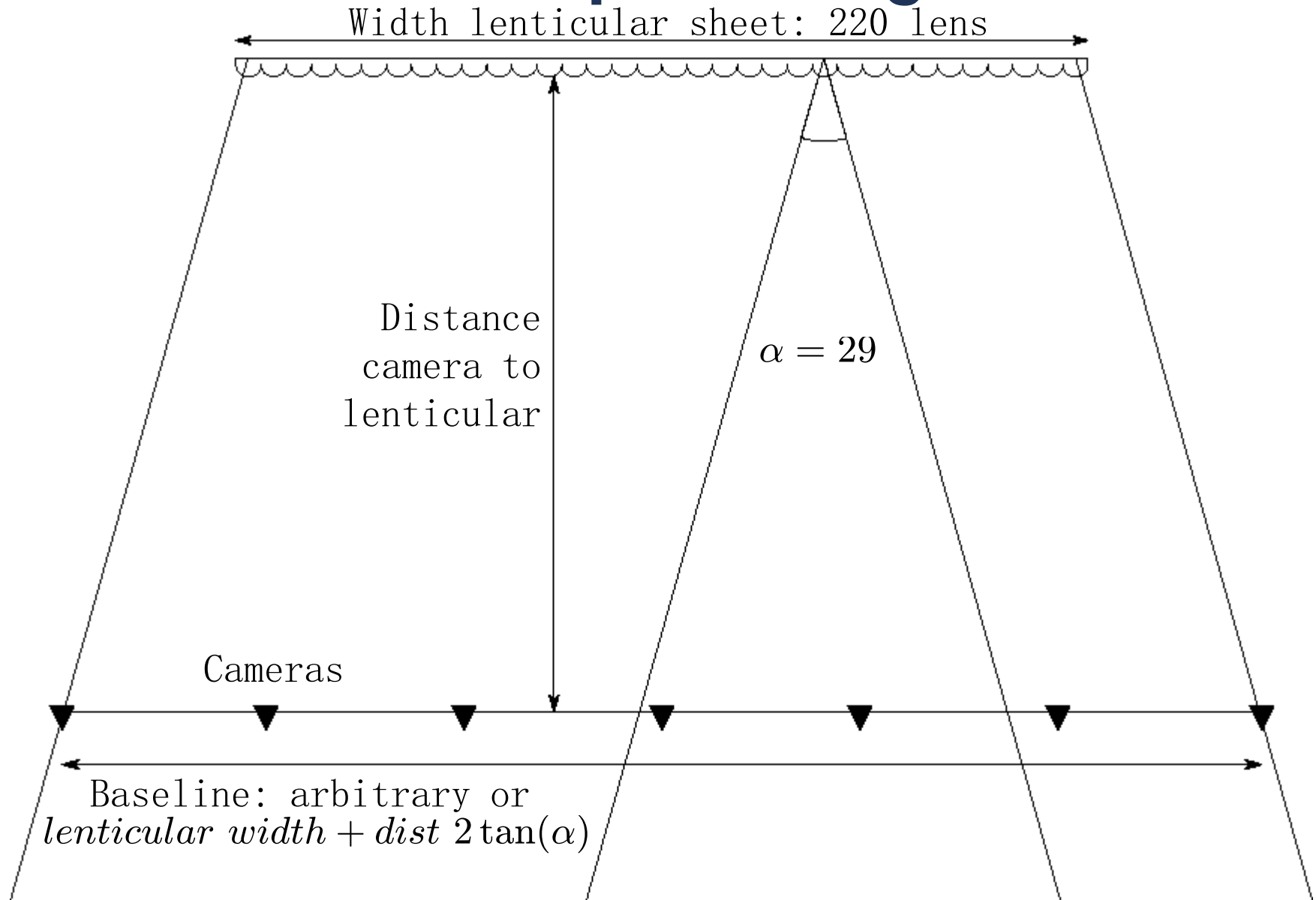

linear interpolated image

sheared interpolated image

Autostereoscopic image

Rays of a
lenticule:
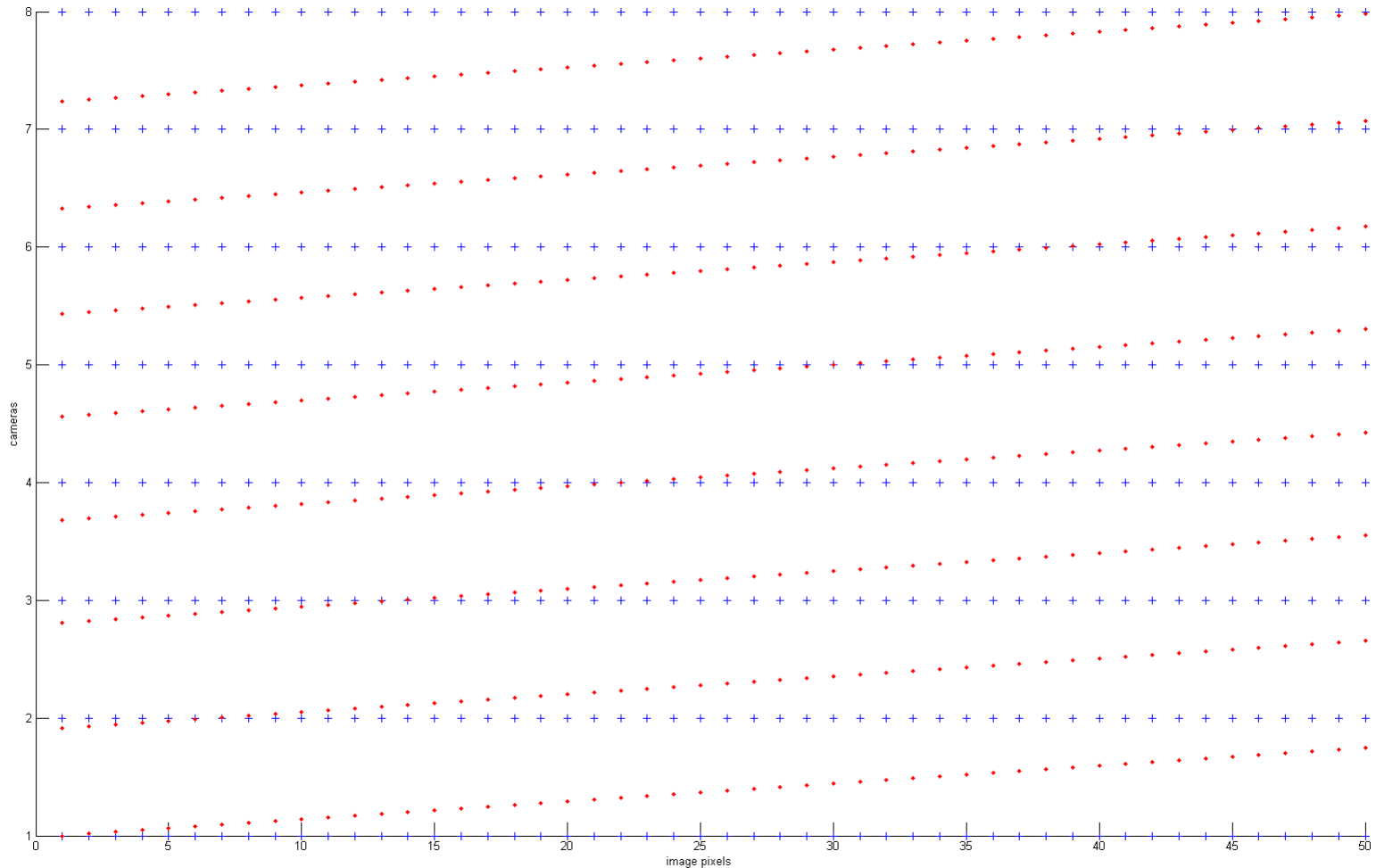7-8 diff. images

Rays of a camera:
for each lenticular
one image pixel

Autostereoscopic image

Width lenticular sheet: 220 lens

Distance camera to lenticular

$\alpha = 29$

Cameras

Baseline: arbitrary or
$lenticular\ width + dist\ 2\tan(\alpha)$

Light Field

Blue: camera rays, red: lenticular rays

1.Questions ?