

# Resampling: Changing Voxel Size

## Why Resample?

- Initial modeling may be easier / more accurate after binning / down-sampling and perhaps NAD (or other) filtering
- Initial alignment / averaging is much faster with down-sampled data (time  $\sim$  voxels<sup>3</sup>).
- Final alignment typically unbinned for best resolution

## Examples: Binning with IMOD

- `binvol -a 5 -b 2 vol.rec vol_bin2.rec`
- `binvol -a 5 -b 3 vol.rec vol_bin3.rec`
  - `-a 5`: Lanczos 2-lobe anti-alias filtering
  - `-b <n>`: bin by integer factor `<n>` in all dimensions
- `squeezevol`: non-integer factors or expansion

## Transforming Models for Resampling

- `3dmod` (often) automatically handles volume rotation / scaling / translation
- PEET does not! Model coordinates must be converted to volume voxel coordinates
- Solution: transform model to match the volume
  - `imodtrans -i vol.rec vol_bin2.mod vol.mod`

## Transforming Motive Lists

- Motive lists contain both angles and shifts
- Shifts (columns 11-13) need to be scaled
- Other columns must not be
- Easily done with any spreadsheet program
  - csv files are easily modified text files
- 2-step process:
  - Create scaled model(s) with `imodtrans -i`
  - Created scaled motive lists with spreadsheet

## An Alternative Easier Way...

- Use `createAlignedModel` to generate:
  - Aligned model(s) with final positions
  - Aligned motive list(s) with angles and all shifts = 0
- Aligned motive list(s) apply to any voxel size!
- Use `imodtrans` to generate a resampled model
- Still 2 steps, but
  - Avoids manual editing of motive lists
  - Aligned motive lists apply to any voxel size

## createAlignedModel and rotAxes Files

- So far, particle Y axes have been implicit
- In some cases (*e.g.* using meshInit, stalkInit, spikeInit or user-specified Y axes), explicit rotAxes files will be present
- createAlignedModel also generates new rotAxes file(s) with revised estimate of axes
  - New estimates typically better if alignment is good
  - Use with caution if initial alignment is poor!

# Questions?