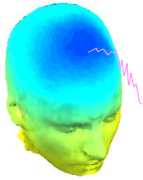
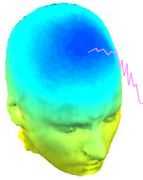
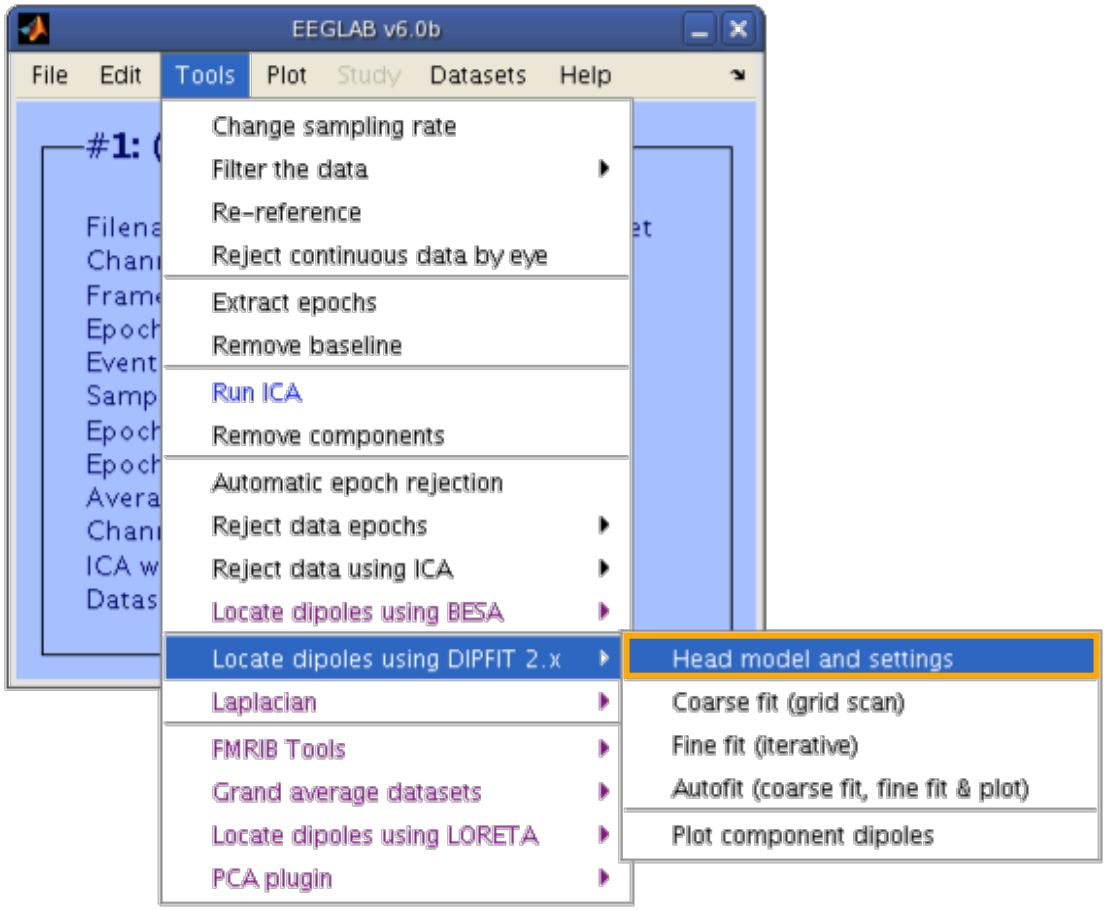
DIPFIT and model co-registration



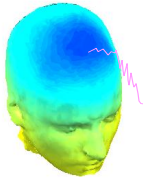
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration

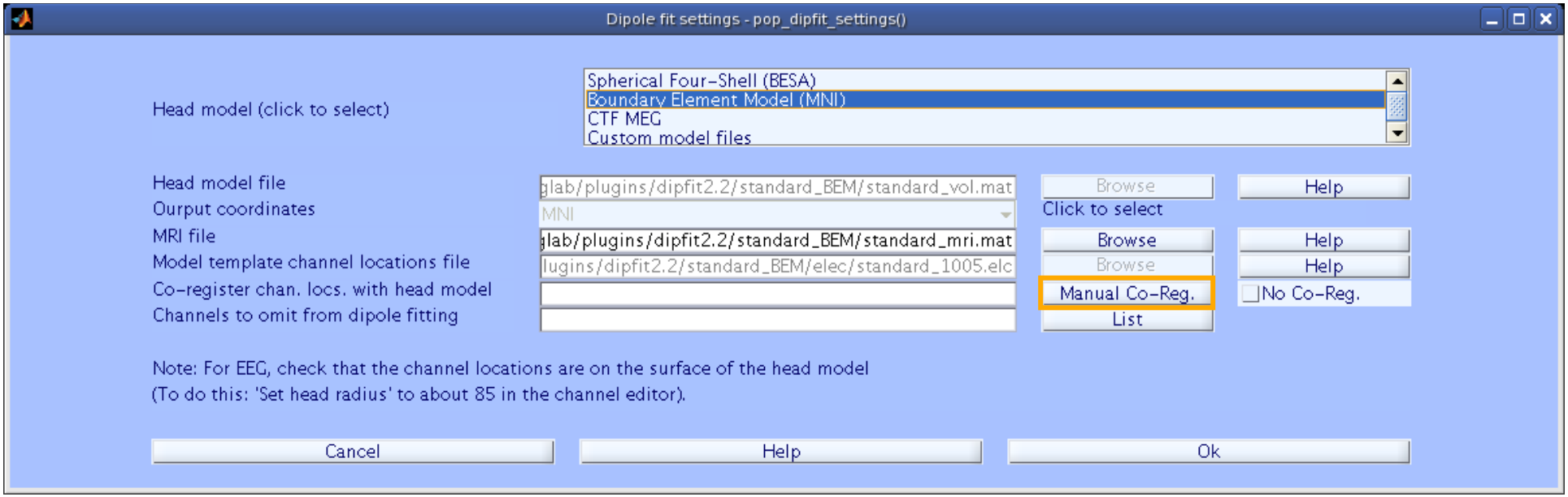
Finding dipole locations using DIPFIT in EEGLAB



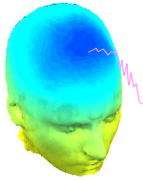


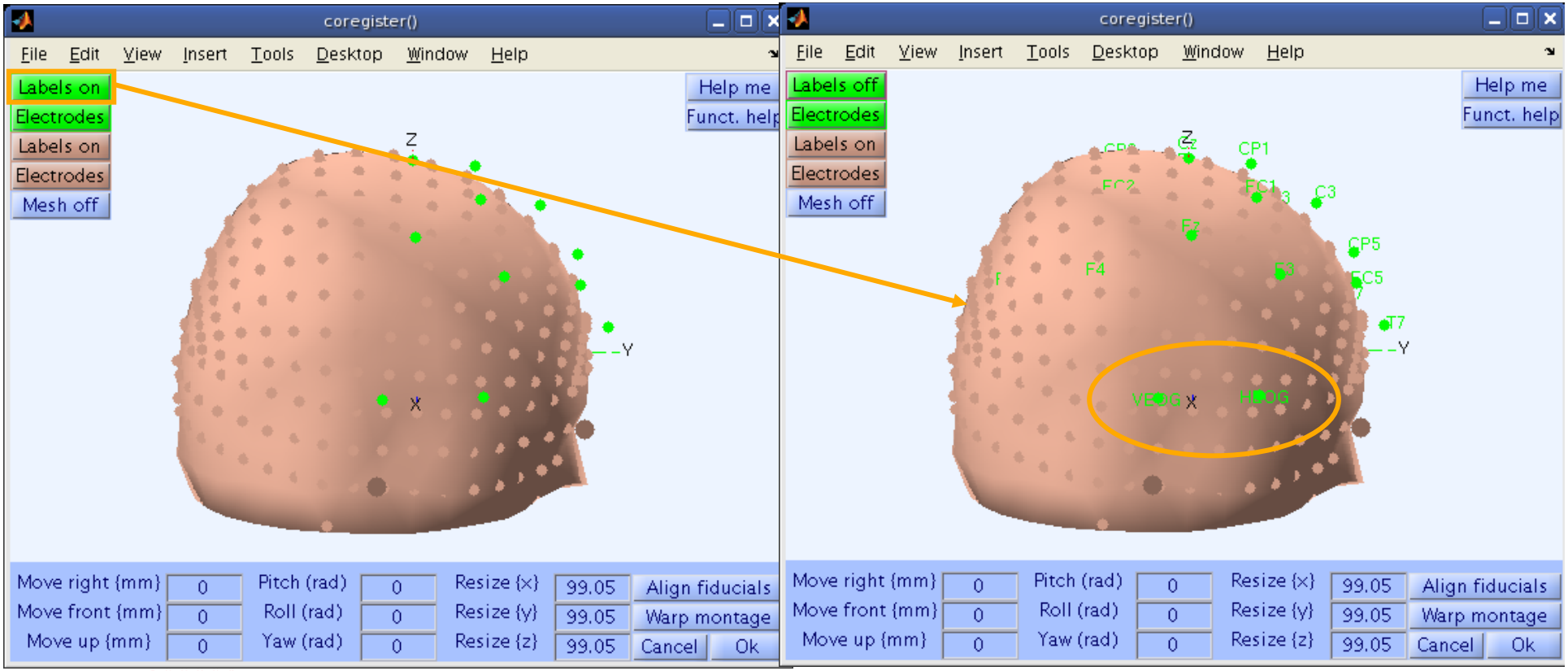
Co-register to model



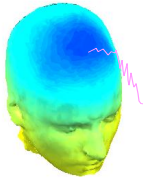


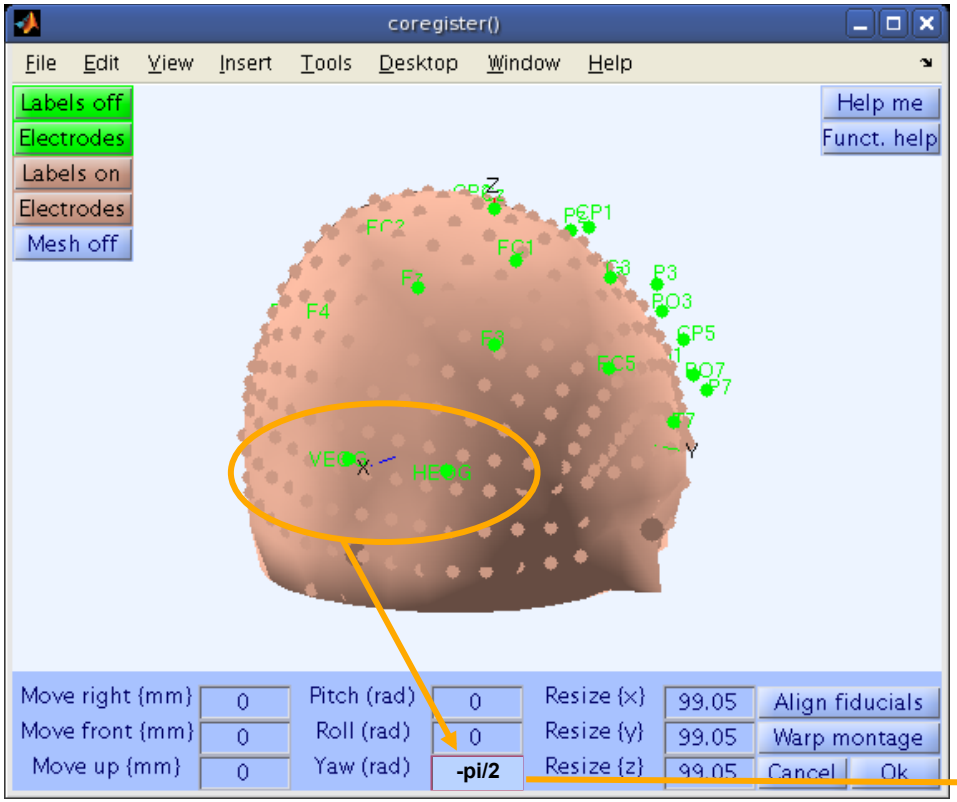
Co-register to model, cont'd

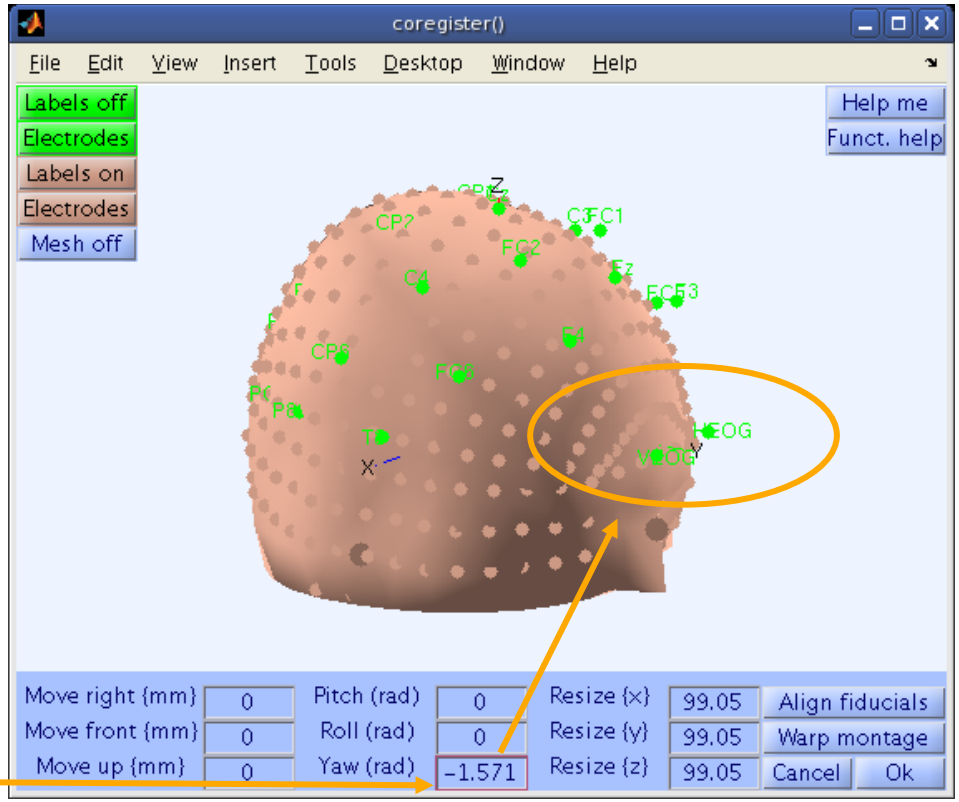




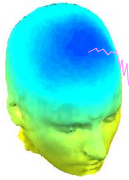
Perform translation of electrode positions

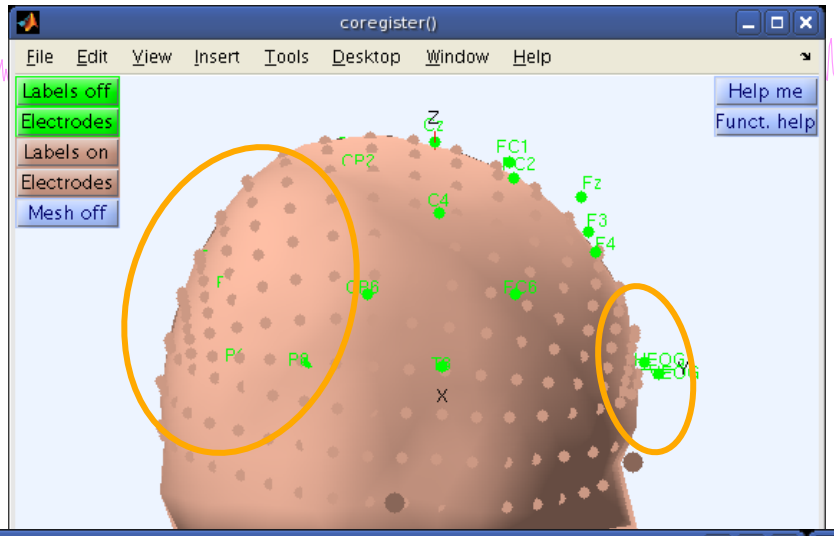


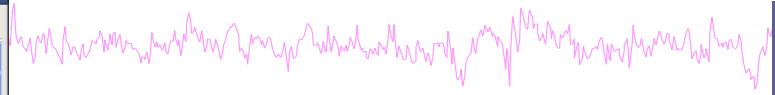




Perform translation of electrode positions



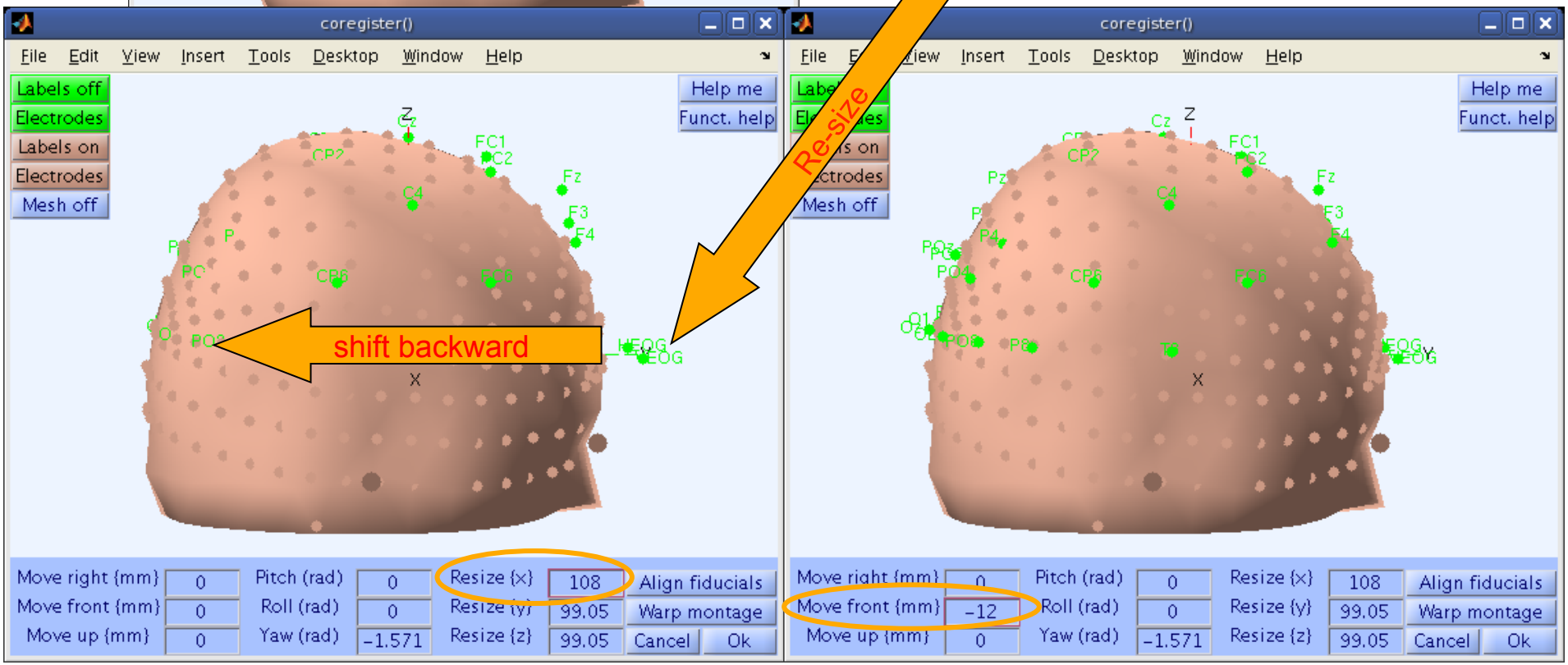




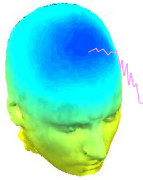
Requires a shift toward back of the head

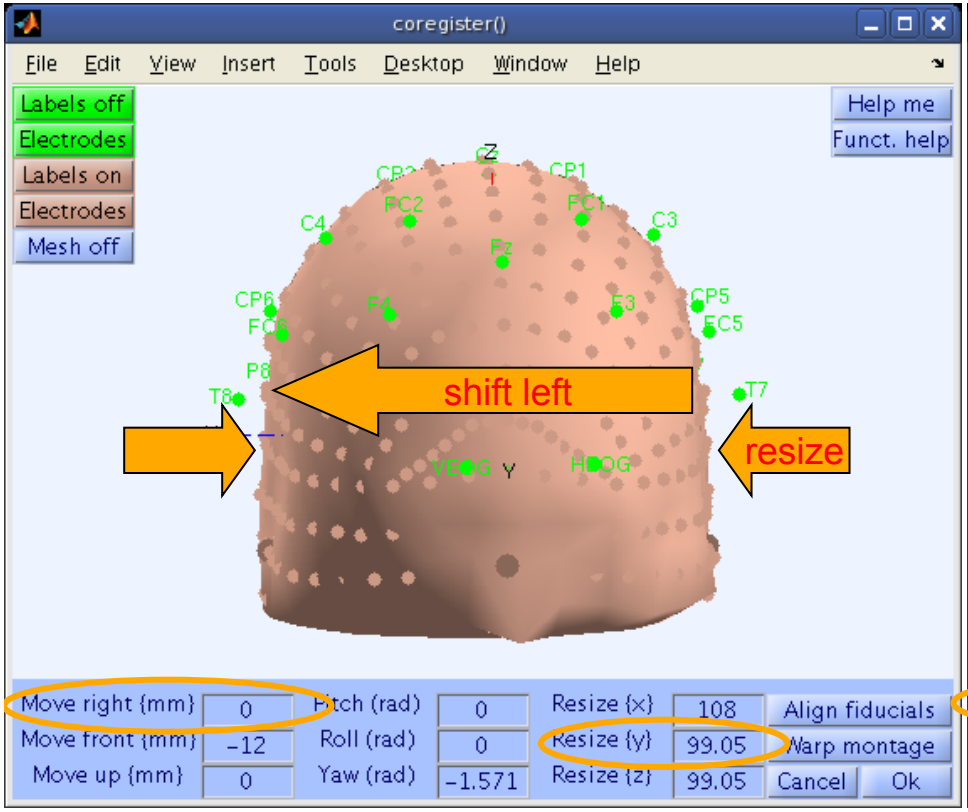
AND

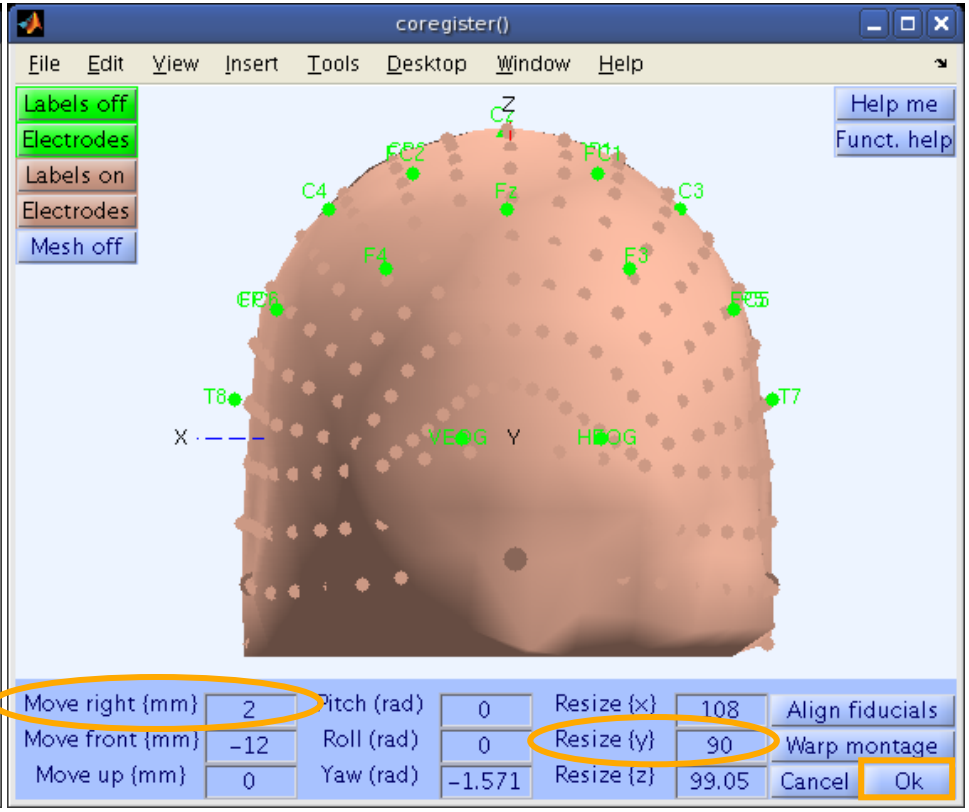
an expansion along the X-axis



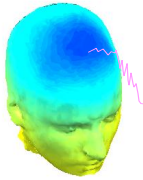
Perform translation of electrode positions



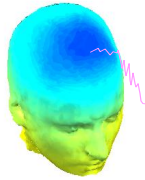


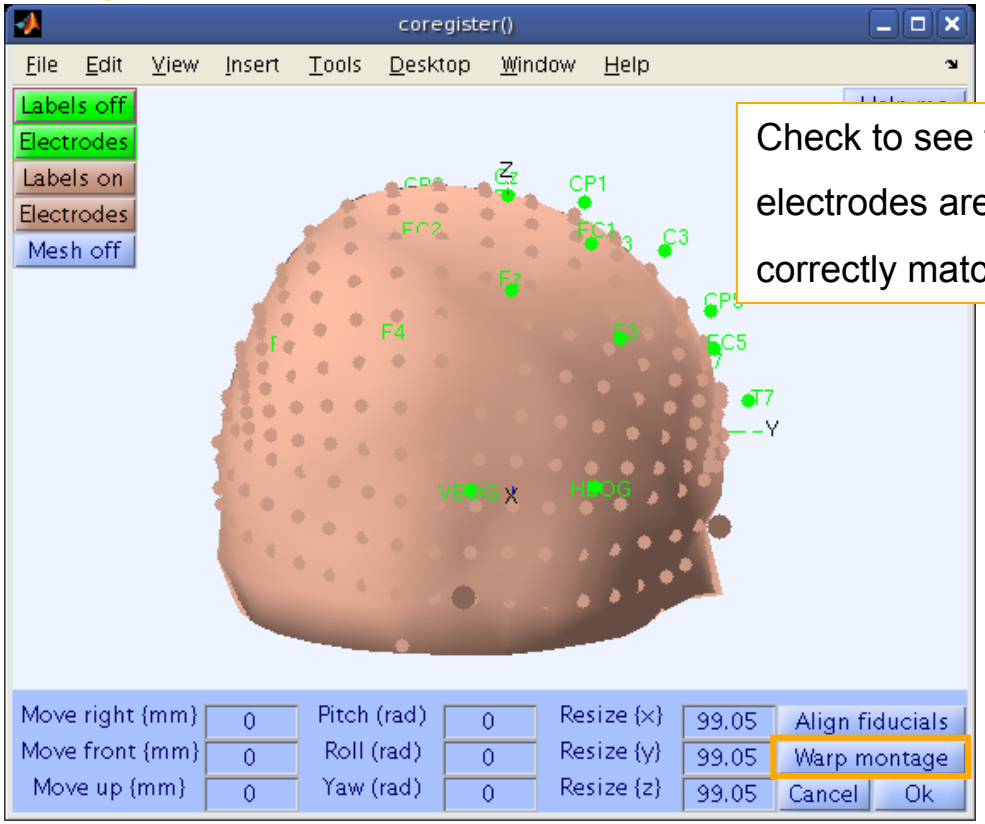


Confirm electrode transformation

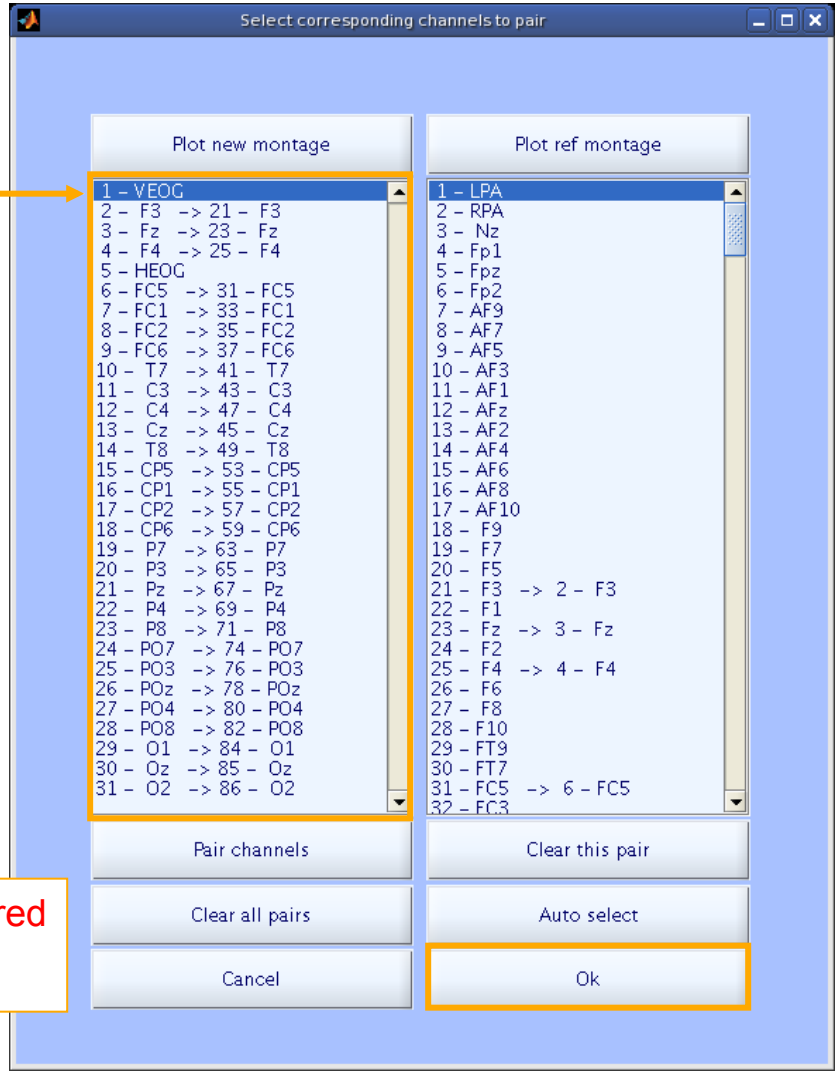


Alternatively, warp to standard montage



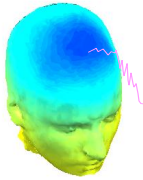


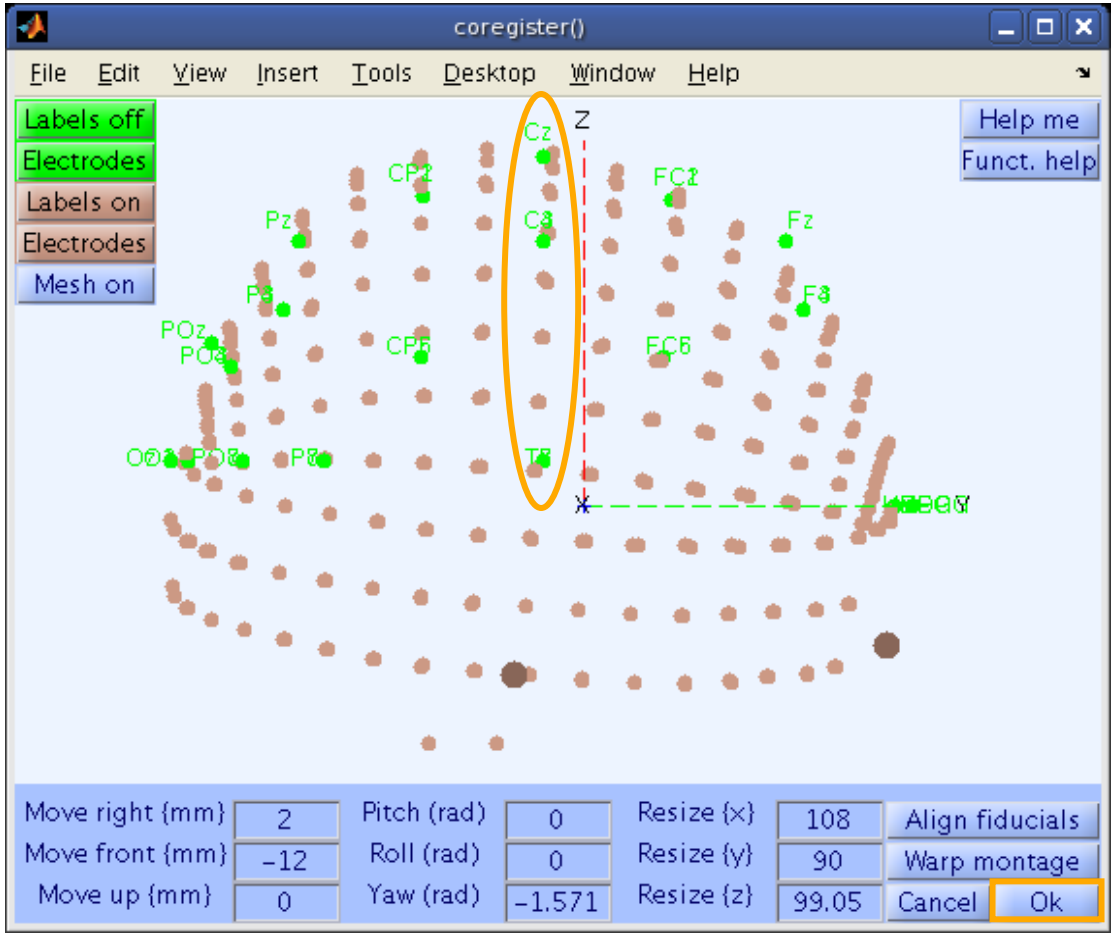
Check to see that electrodes are correctly matched



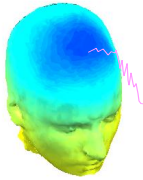
stats toolbox required for warping

Check coregistration with model





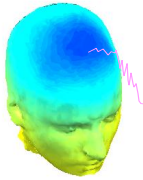
EEG.dipfit structure



```
>> EEG.dipfit
ans =
            hdmfile: [1x76 char]
            mrifile: [1x71 char]
           chanfile: [1x83 char]
            chansel: [1x33 double]
         coordformat: 'spherical'
              model: [1x33 struct]
            current: 32
                vol: [1x1 struct]
     coord_transform: [0 0 -1.570796 100 76 90.87264 1 1 1]
```

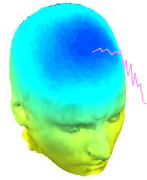
From head model transformations

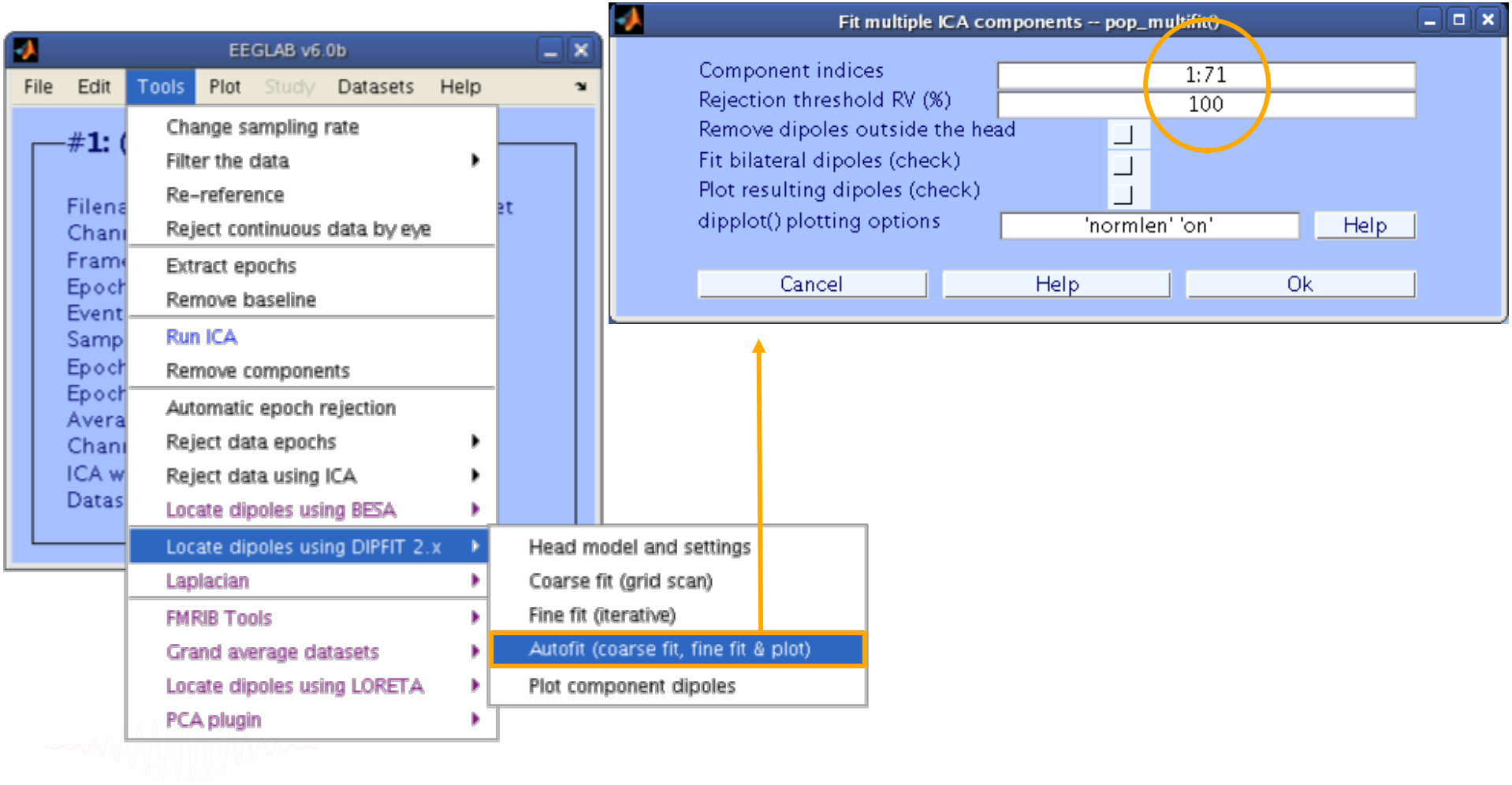
DIPFIT and model co-registration



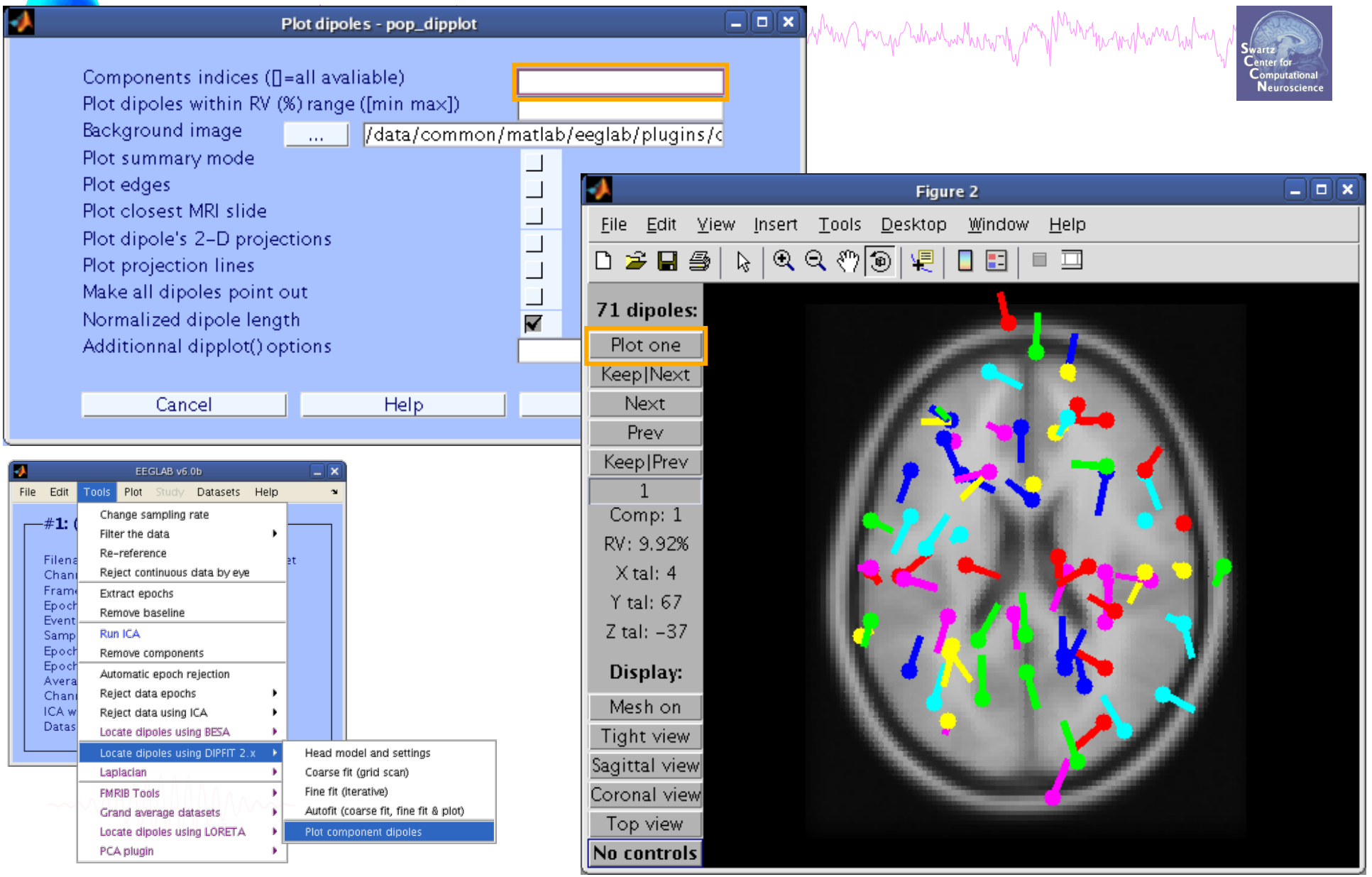
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration

Autofit equivalent dipoles

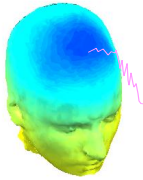


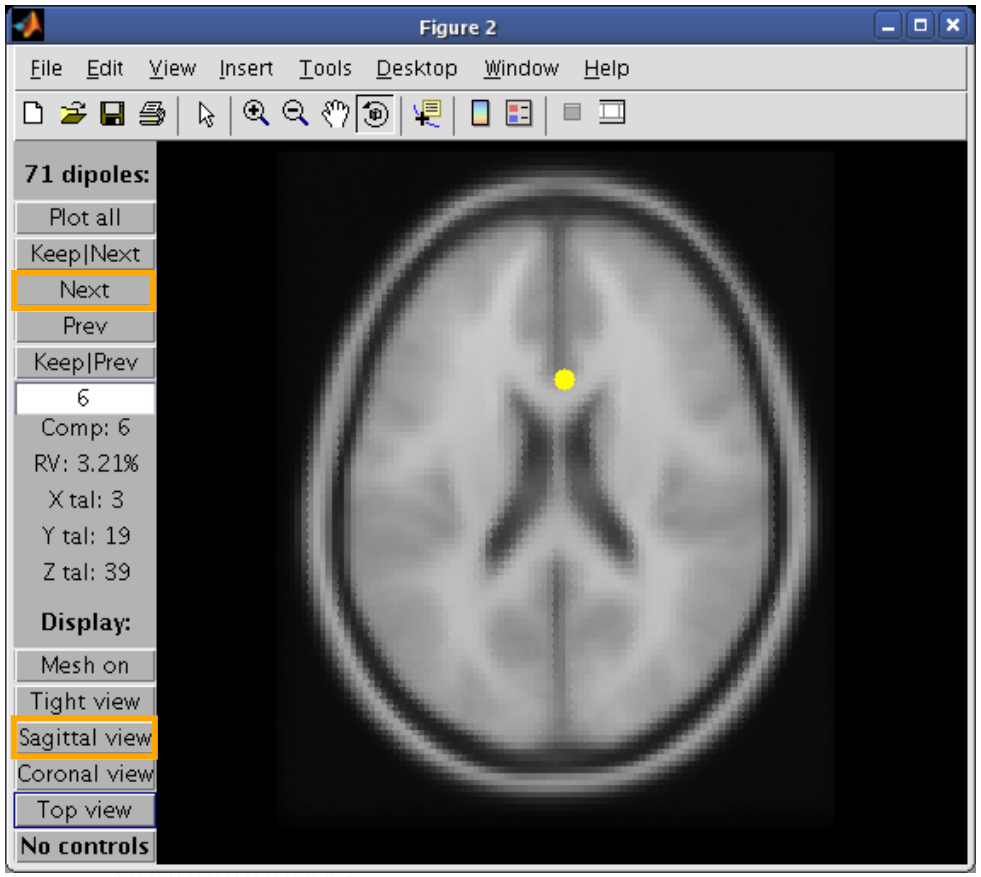


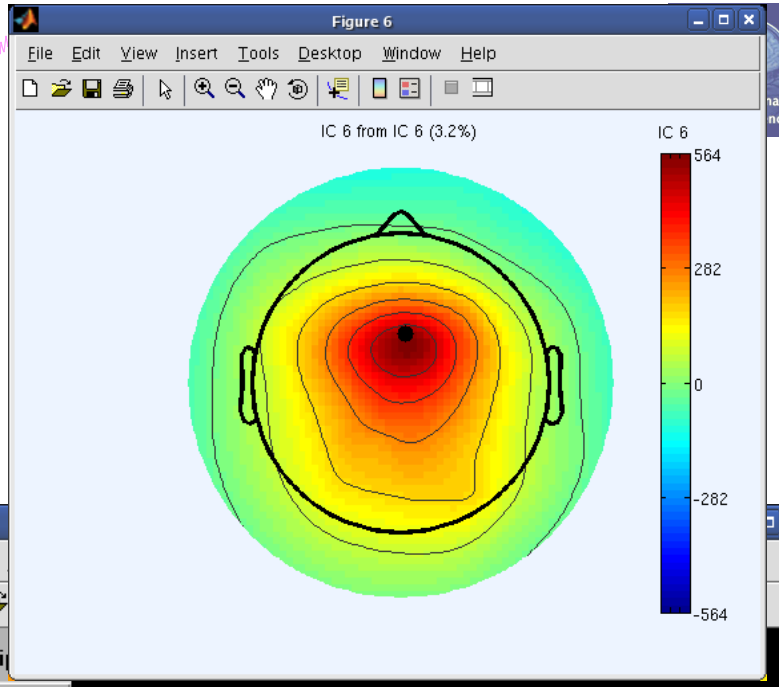
Plot dipoles

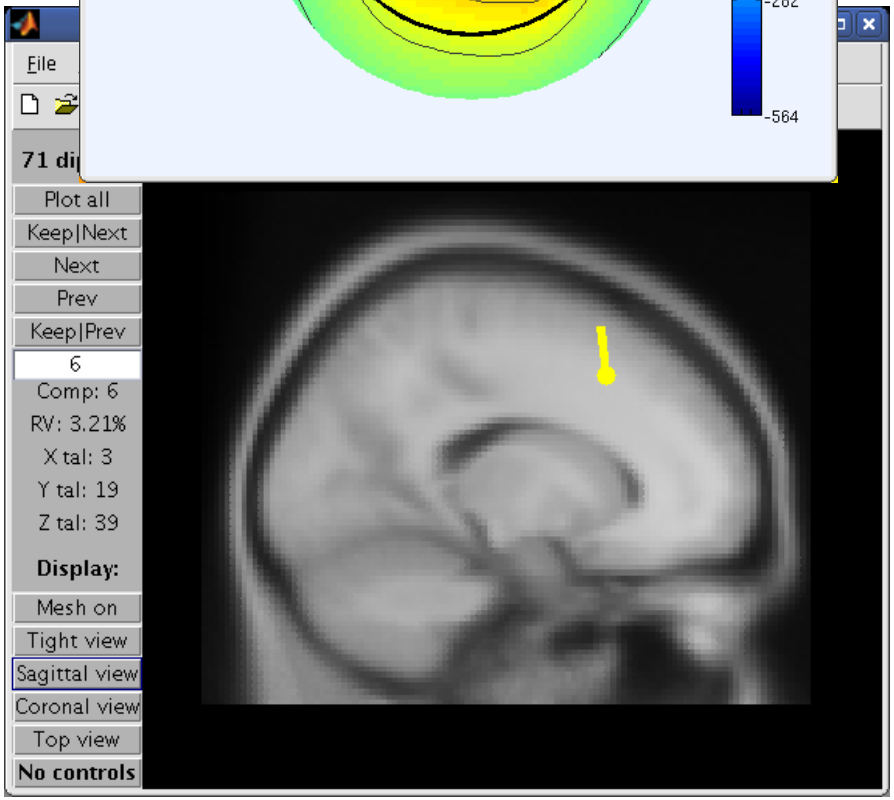


Scroll through dipoles

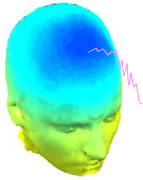


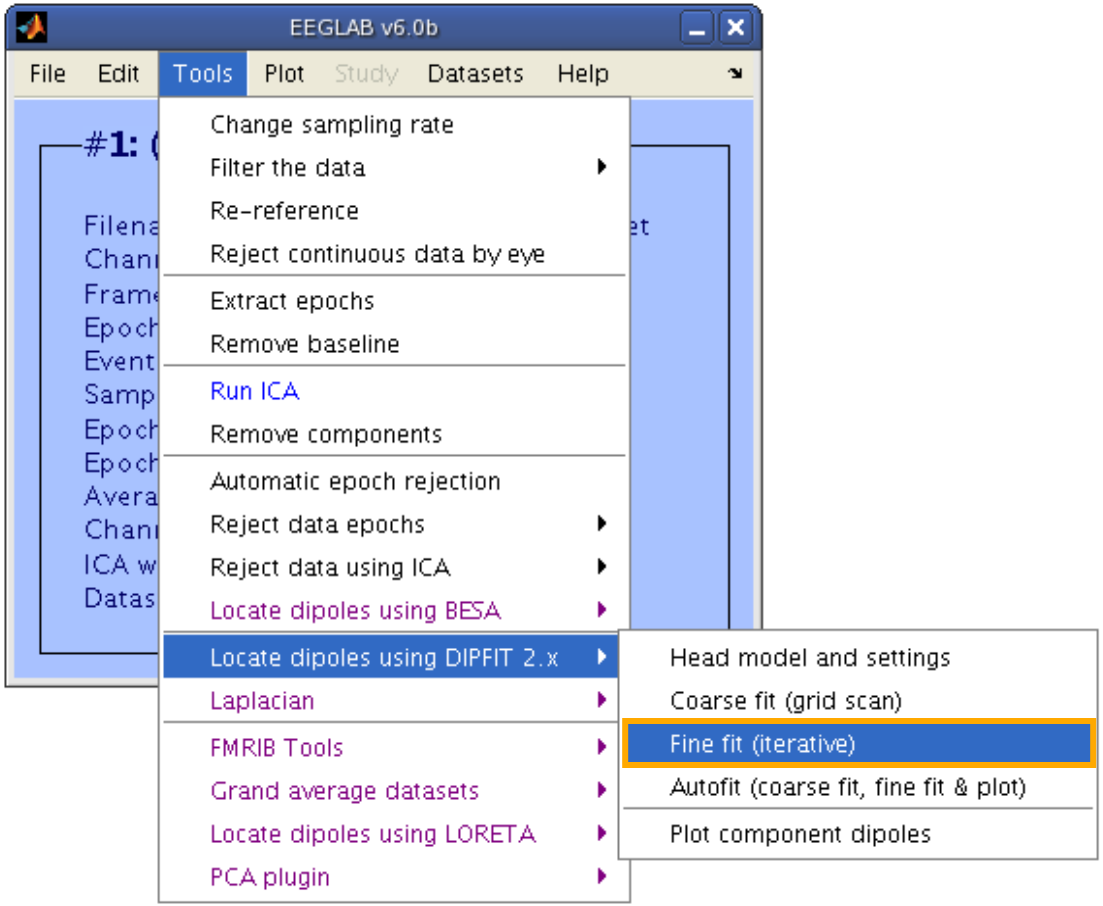




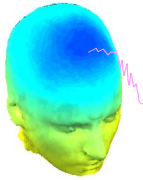


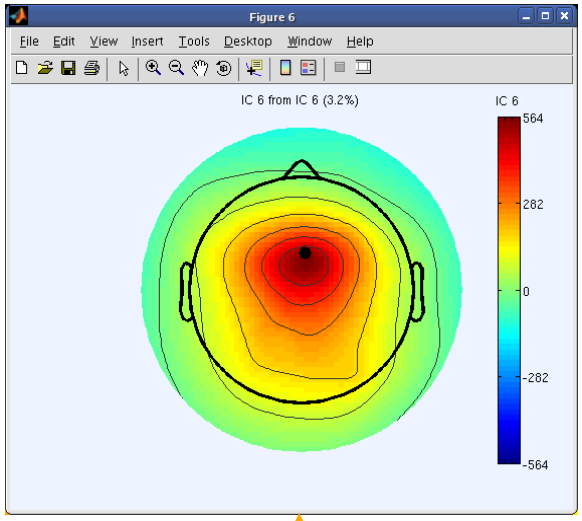
Fine fit options in DIPFIT





Fine fit menu





Manual dipole fit -- pop_dipfit_nonlinear()

Component to fit 6 | Plot map | Residual variance = 3.21%

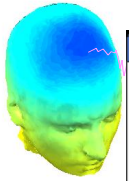
dipole	fit	position	moment	
#1	☑	28.222 -2.401 37.331	2.380 475942.653 3819304.288	Flip (in|out)
#2	☐	0.000 0.000 0.000	0.000 0.000 0.000	Flip (in|out)

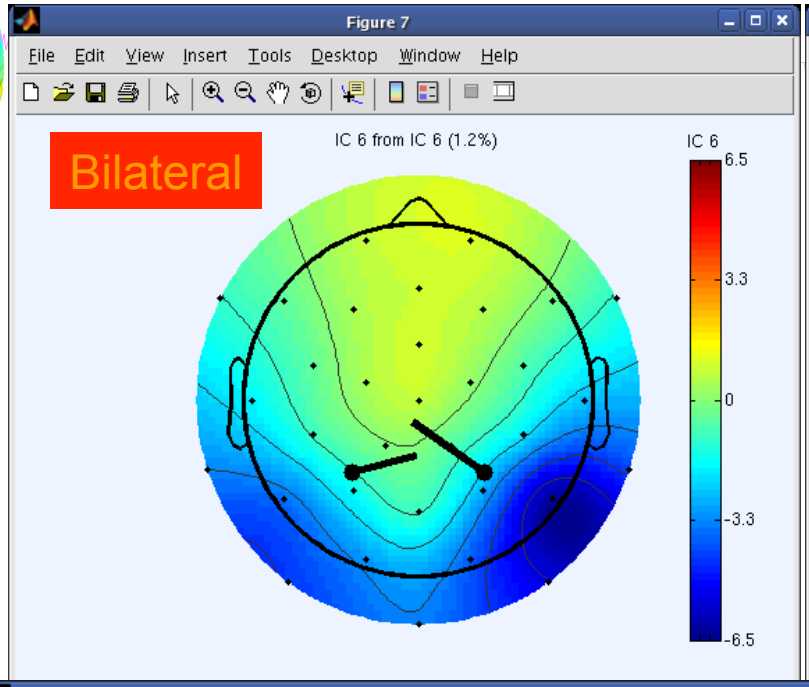
☑ Symmetry constrain for dipole ...

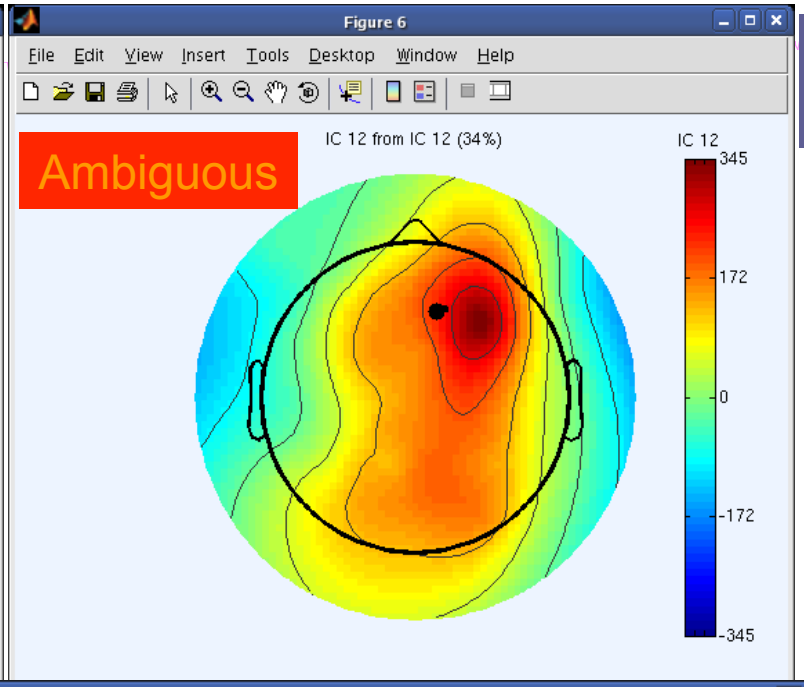
Fit dipole(s)' position & moment | Or fit only dipole(s)' moment | Plot dipole(s)

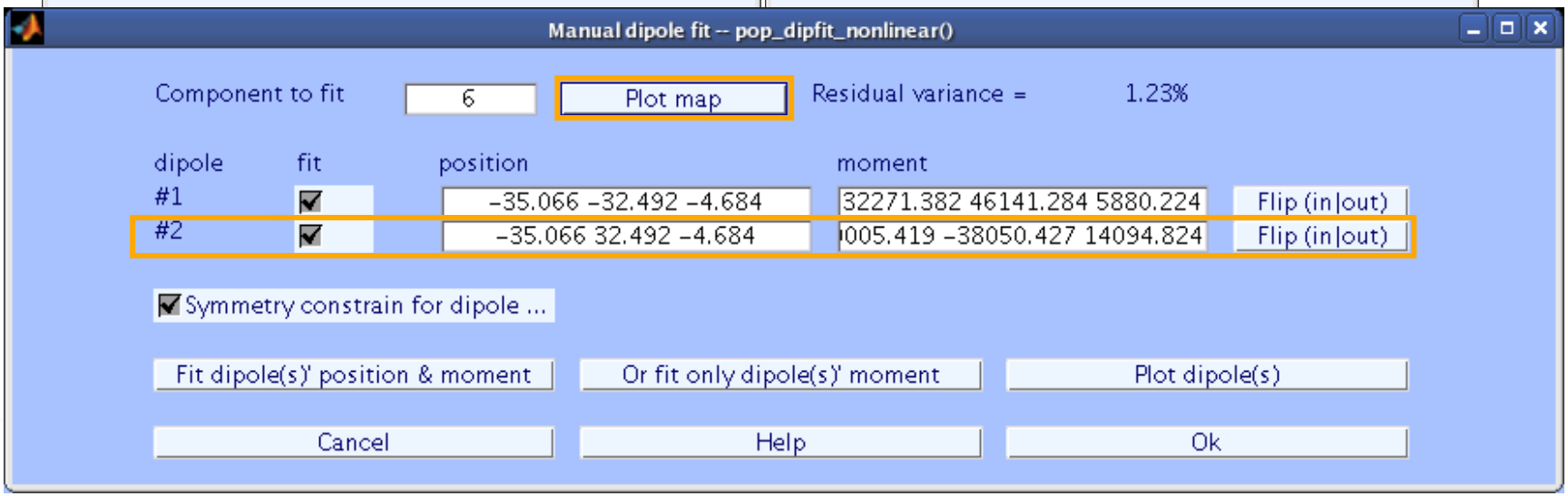
Cancel | Help | Ok

Bilateral dipoles

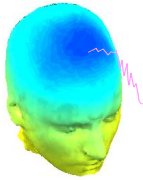








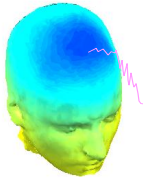
EEG.dipfit structure



```
>> EEG.dipfit.model
ans =

1x33 struct array with fields:
    posxyz
    momxyz
    rv
    active
    select

>> EEG.dipfit.model(1)
ans =

    posxyz: [1x3 double]
    momxyz: [1x3 double]
        rv: 0.0288
    active: 1
    select: 1
```

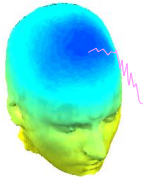
```
                X           Y           Z
[14.9791   -86.0094   47.9448]
```

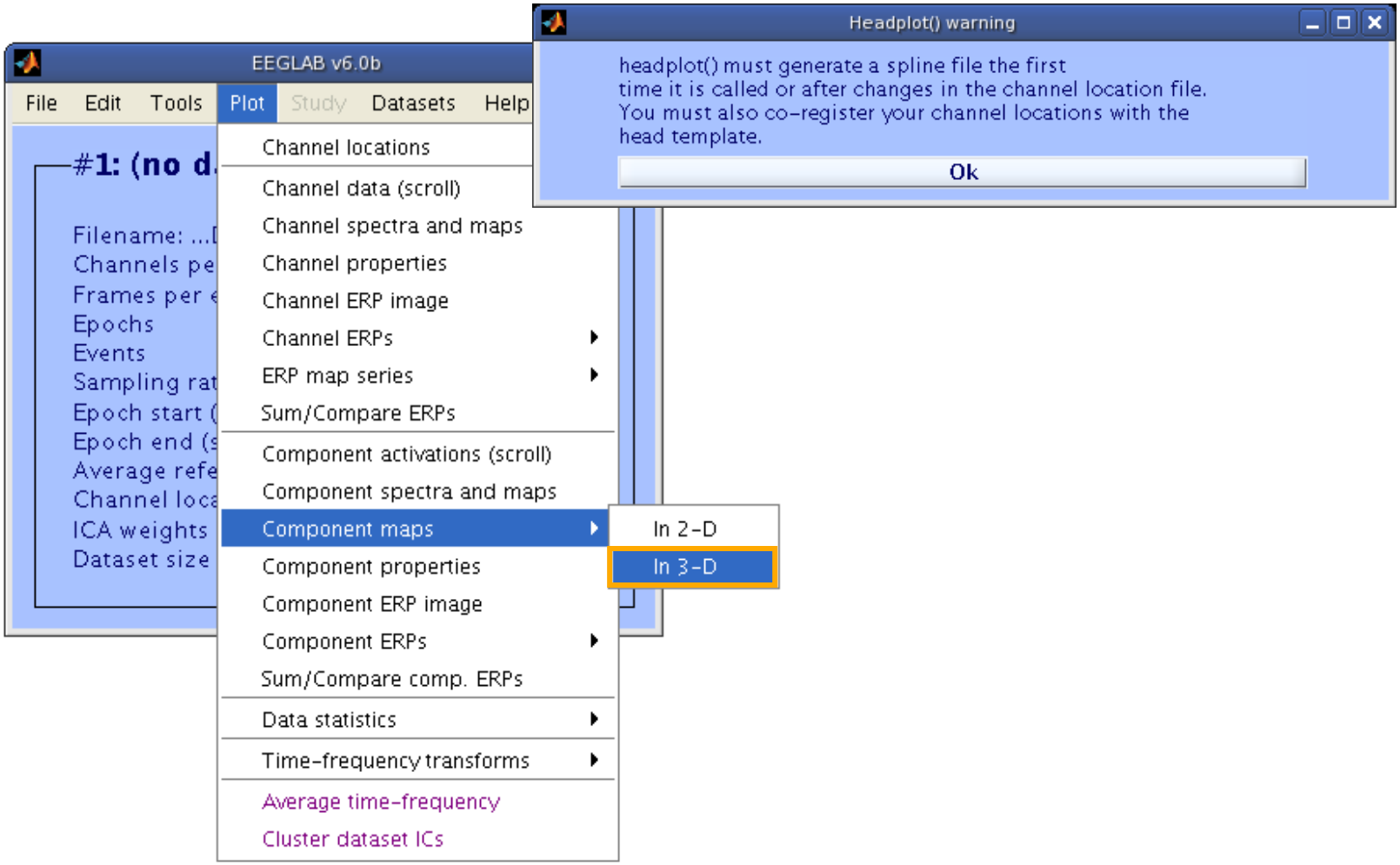
DIPFIT and model co-registration



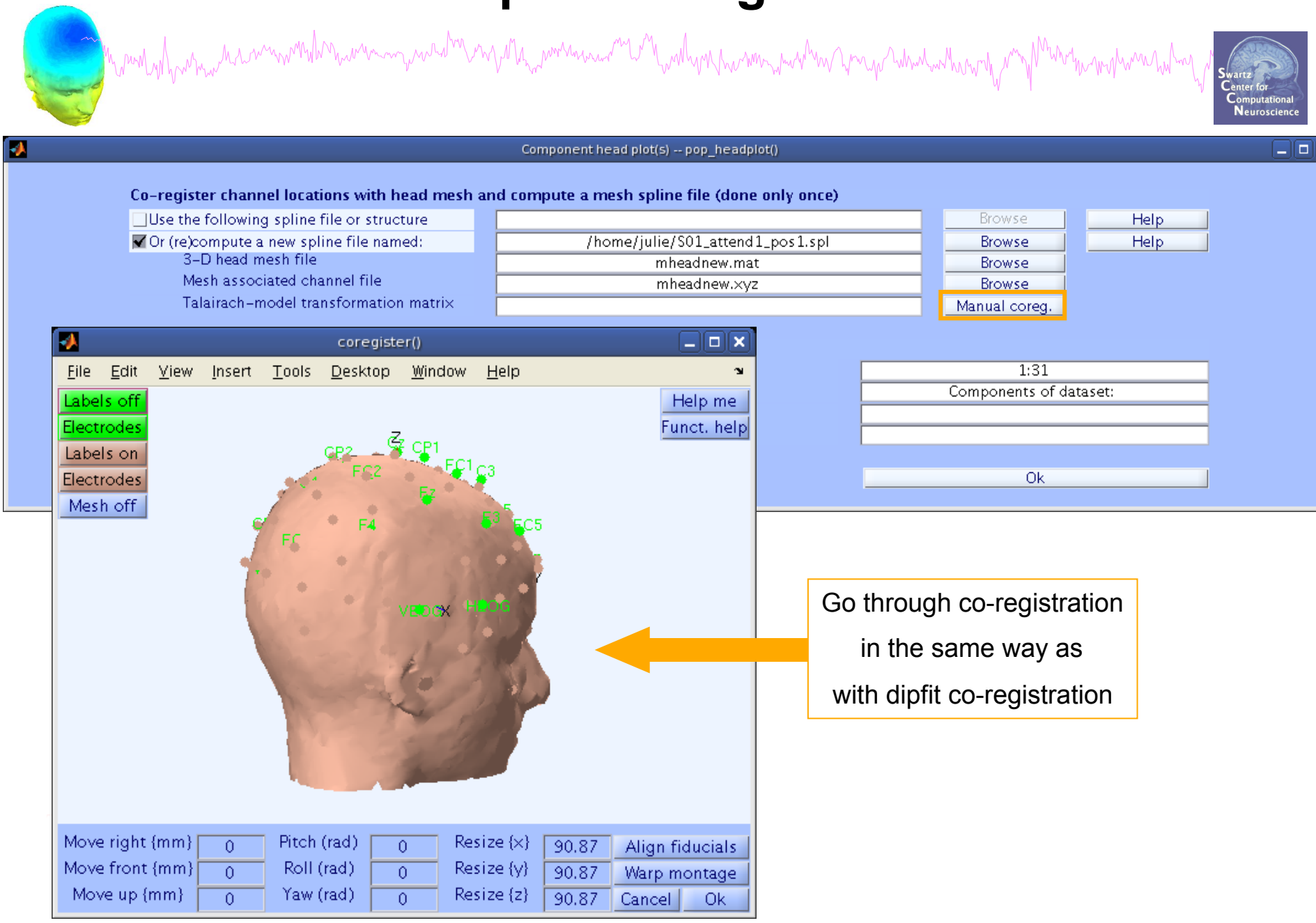
1. Co-register electrodes with model
2. Demonstration
3. 3D headplot co-registration

Plot scalp maps in 3D



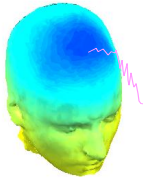


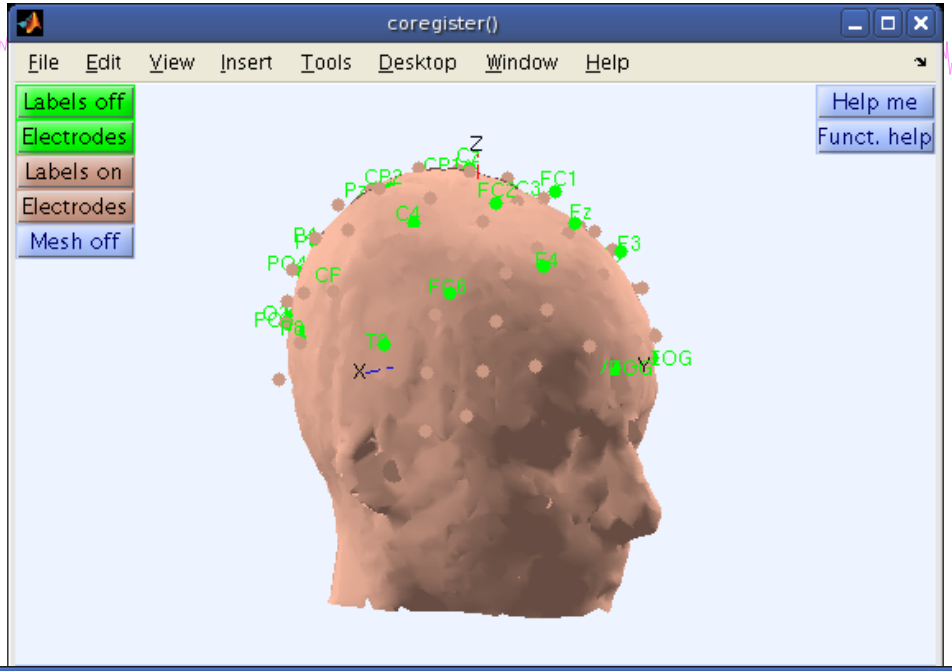
Headplot co-registration

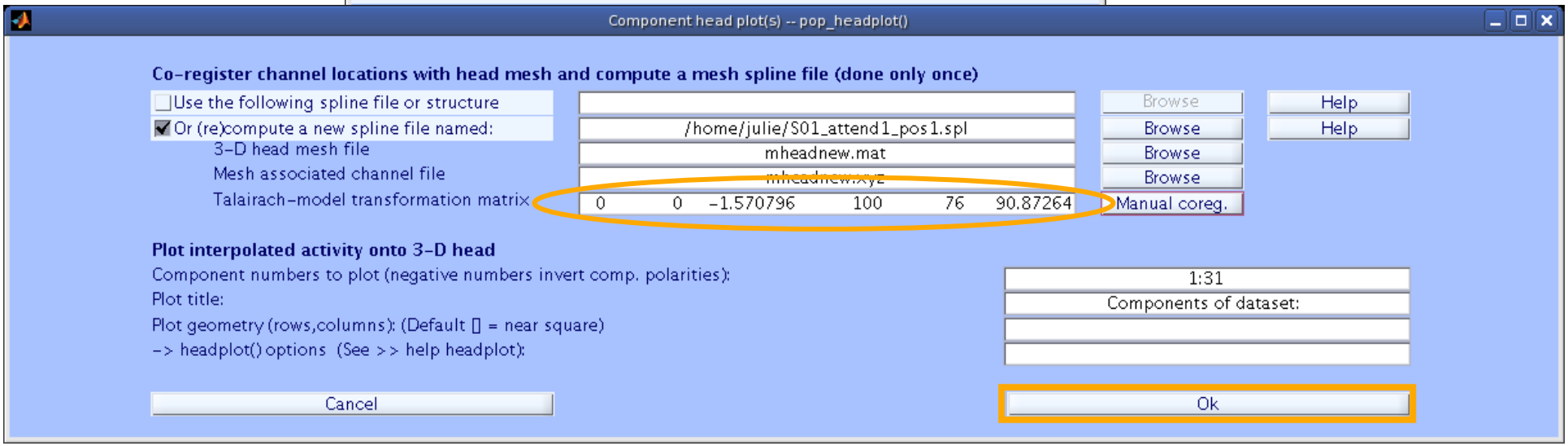


Go through co-registration in the same way as with dipfit co-registration

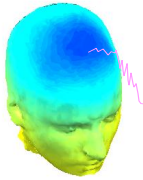
Confirm headplot co-registration

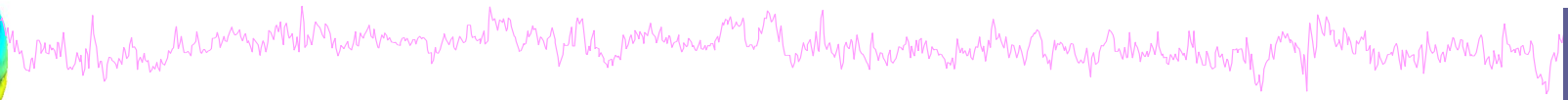






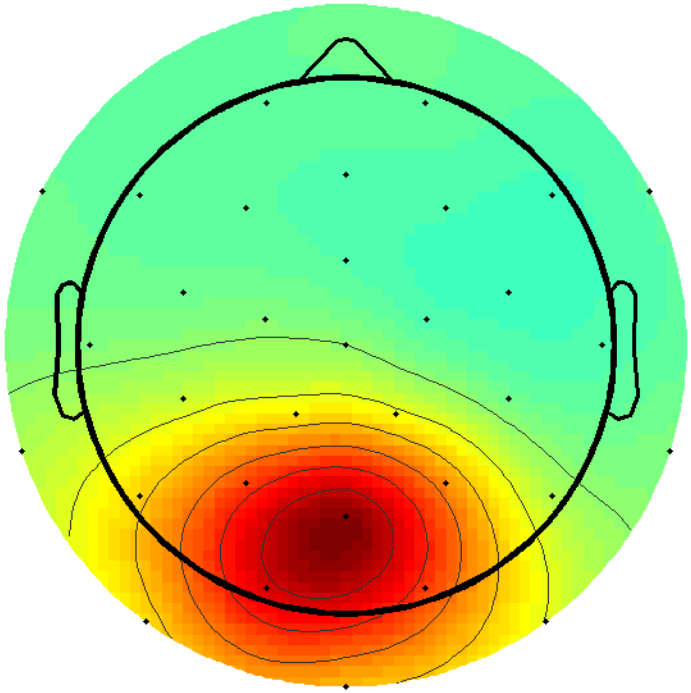
Spline file in EEG structure



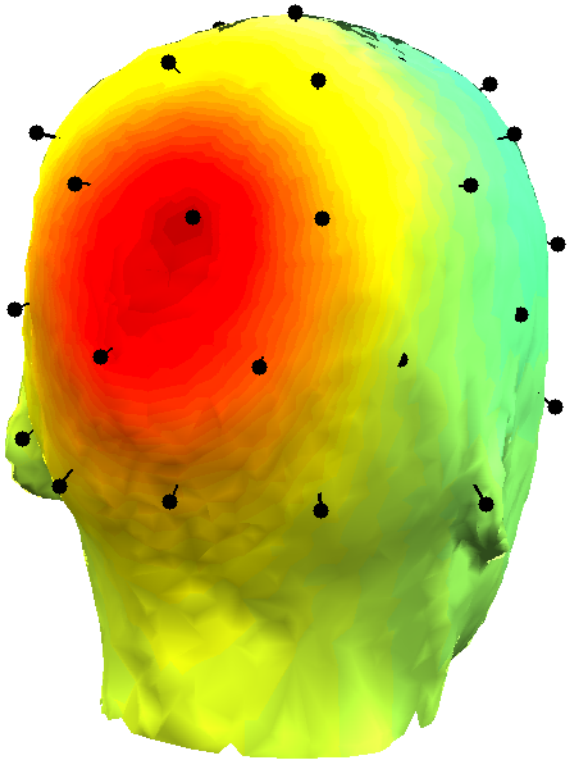


Swartz Center for Computational Neuroscience

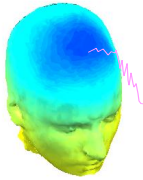
2D scalp map for IC 12



3D scalp map for IC 12



Exercise



- **Novice / Intermediate**
  - Load ‘stern125.set’
  - Practice co-registering electrodes with **BEM** model (choose 'Erase' because this dataset has co-registration done already)
  - Autofit IC dipoles
  - Fine fit dipoles
  - Plot dipoles from the GUI; scroll through components individually
  - Co-register the head model for 3D scalp map plotting. Then plot some ICs in 3D
- **Advanced**

  - In the Finefit menu, try fitting a bilateral dipole, what happens to the residual variance?

  - Try plotting a subset of dipoles in 'summary mode'

  - Try purposely misaligning electrodes with model, how far off are the resulting dipoles from the original locations?