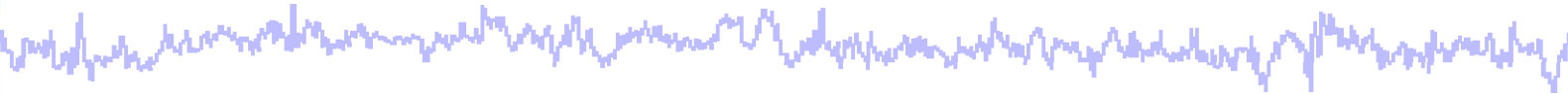


DIPFIT and model co-registration



Task 1

Co-register electrodes with model

Task 2

Autofit equivalent dipoles

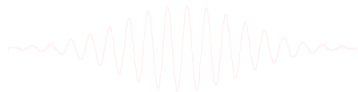
Task 3

Fine fit options

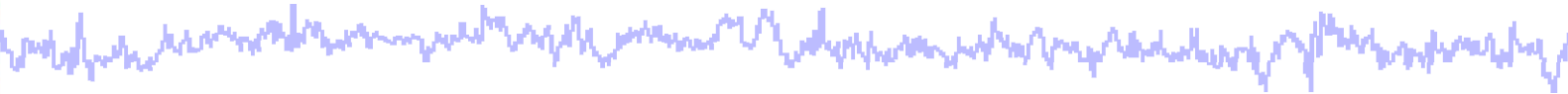
Task 4

3D *headplot()* co-registration

Exercise...



DIPFIT and model co-registration



Task 1

Co-register electrodes with model

Task 2

Autofit equivalent dipoles

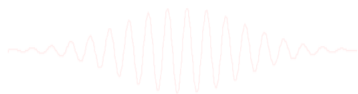
Task 3

Fine fit options

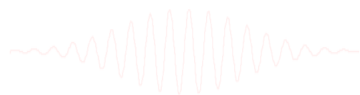
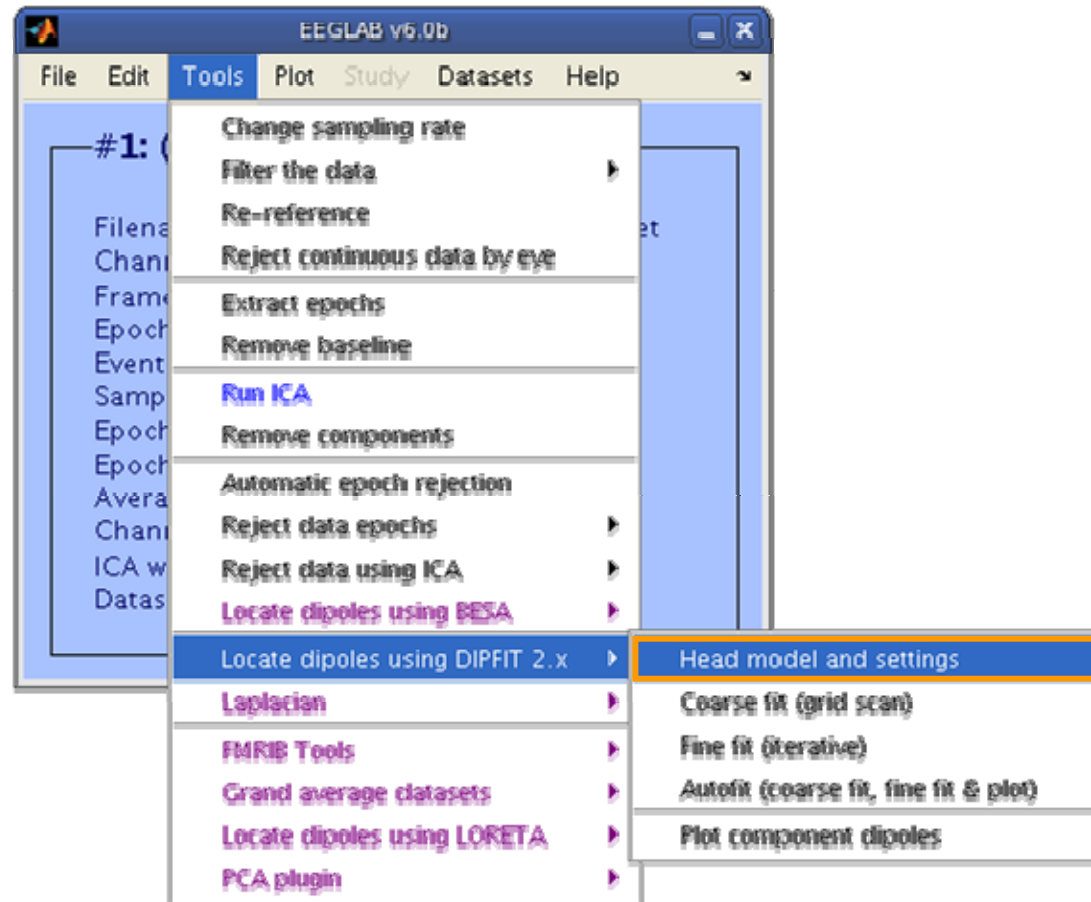
Task 4

3D *headplot()* co-registration

Exercise...



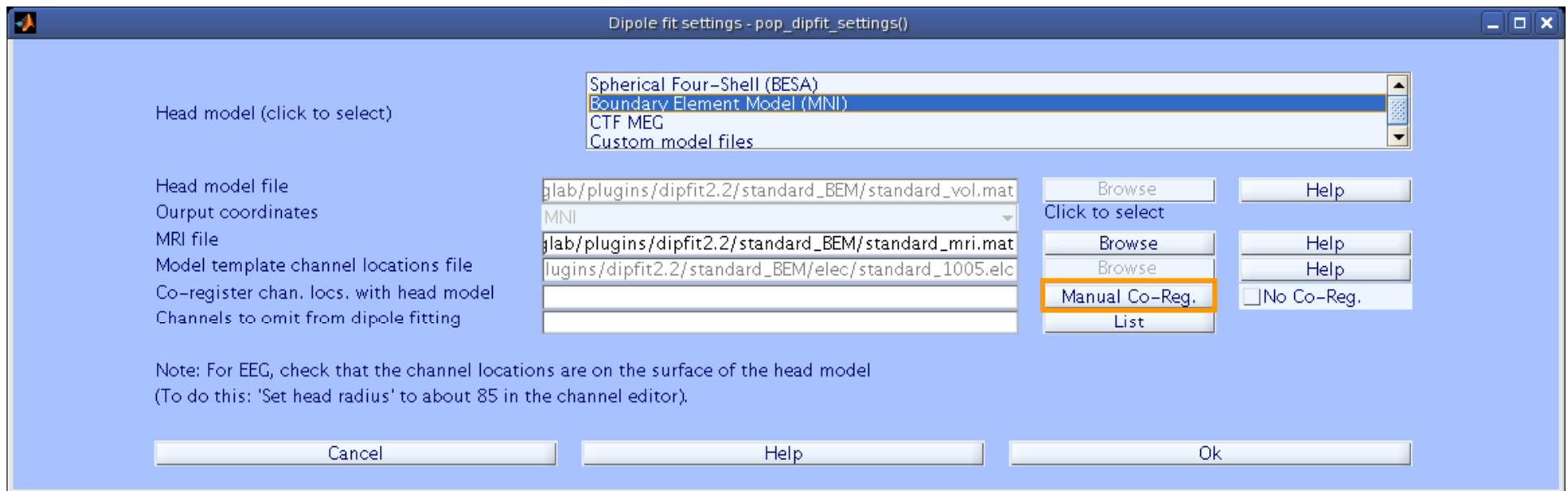
Finding dipole locations



Co-register to model

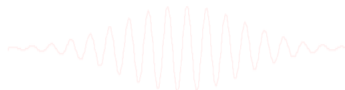


If you used a standard electrode location file, co-registration is automatic.



If you proceed to overwrite co-registration for standard locations:

- Your choice of 4-shell vs BEM **must** correspond to your choice in Edit-> Channel locations



Co-register to model, cont'd



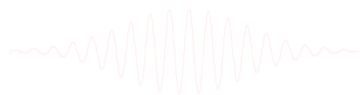
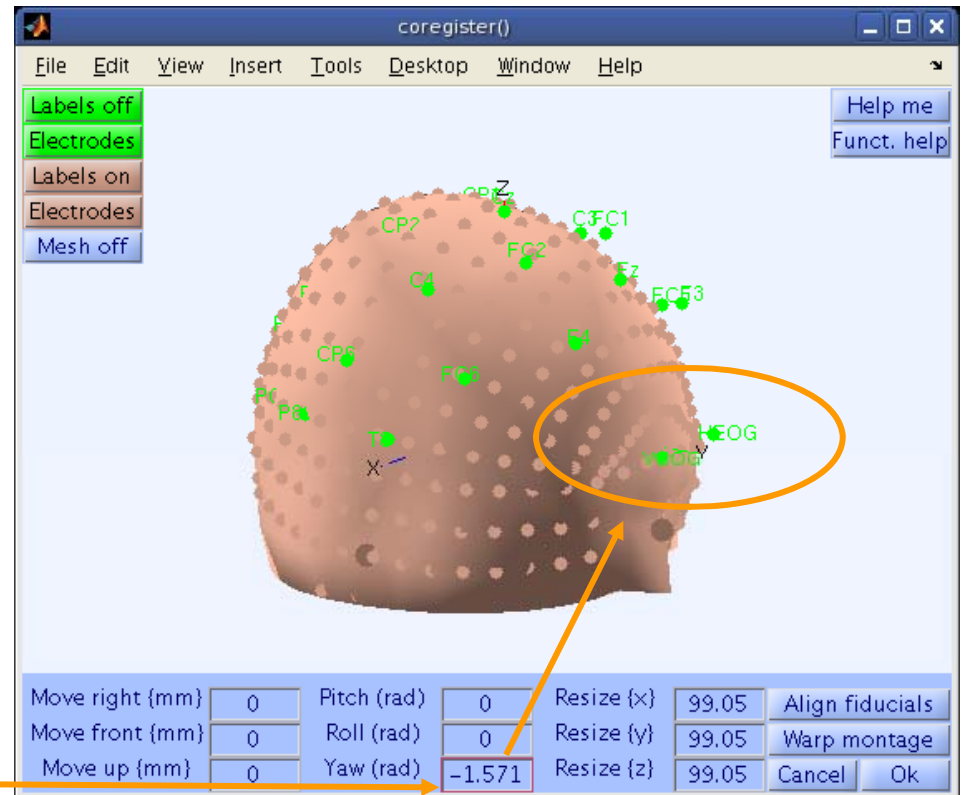
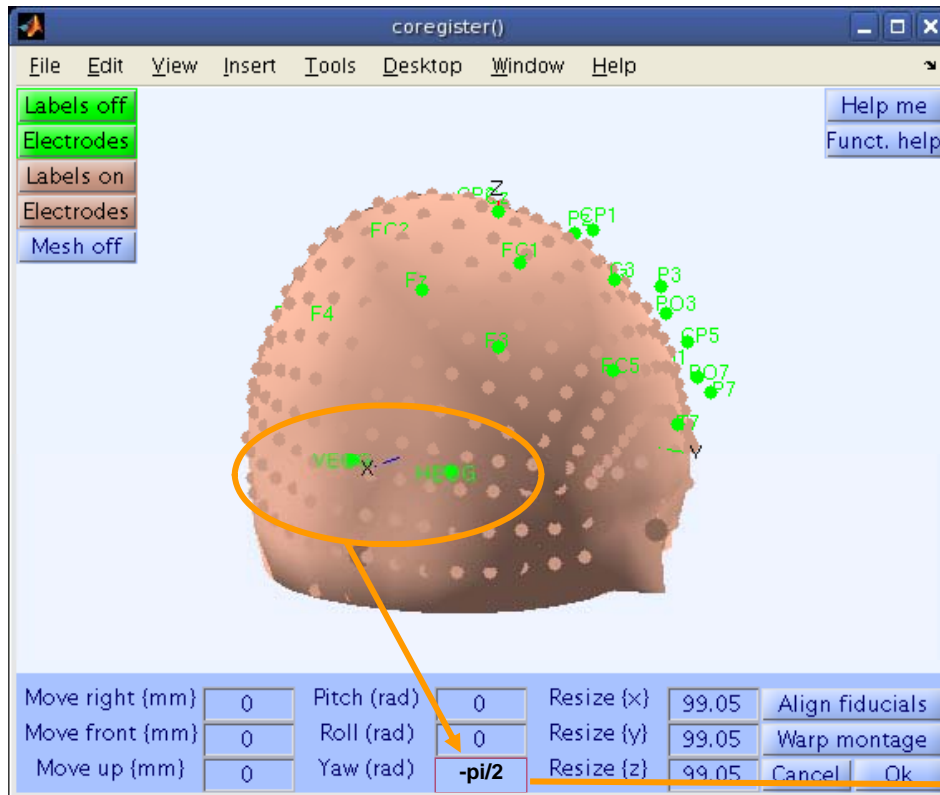
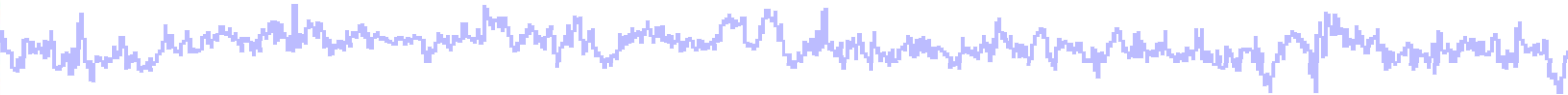
Labels on
Electrodes
Labels on
Electrodes
Mesh off

Labels off
Electrodes
Labels on
Electrodes
Mesh off

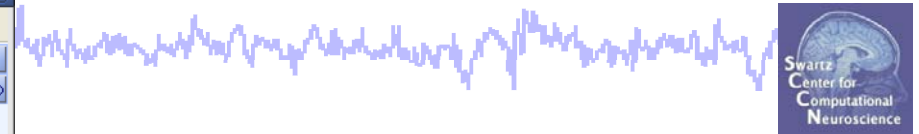
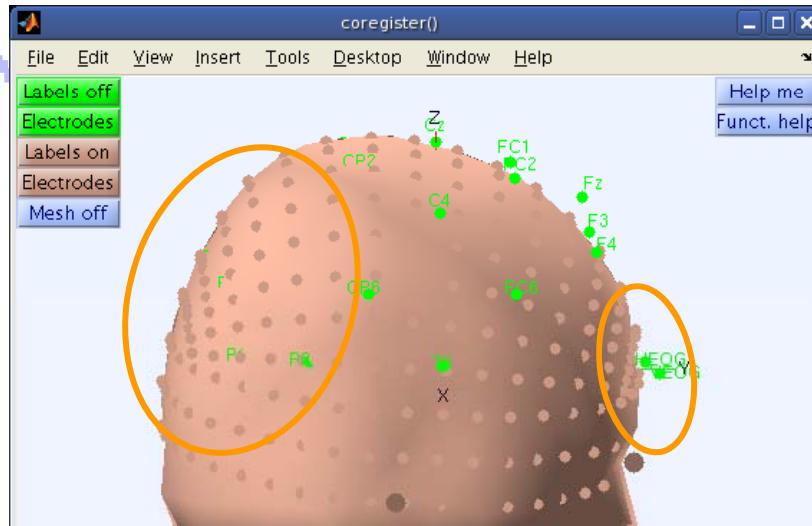
Move right {mm}	0	Pitch (rad)	0	Resize {x}	99.05	Align fiducials
Move front {mm}	0	Roll (rad)	0	Resize {y}	99.05	Warp montage
Move up {mm}	0	Yaw (rad)	0	Resize {z}	99.05	Cancel Ok

Move right {mm}	0	Pitch (rad)	0	Resize {x}	99.05	Align fiducials
Move front {mm}	0	Roll (rad)	0	Resize {y}	99.05	Warp montage
Move up {mm}	0	Yaw (rad)	0	Resize {z}	99.05	Cancel Ok

Perform translation of electrode positions



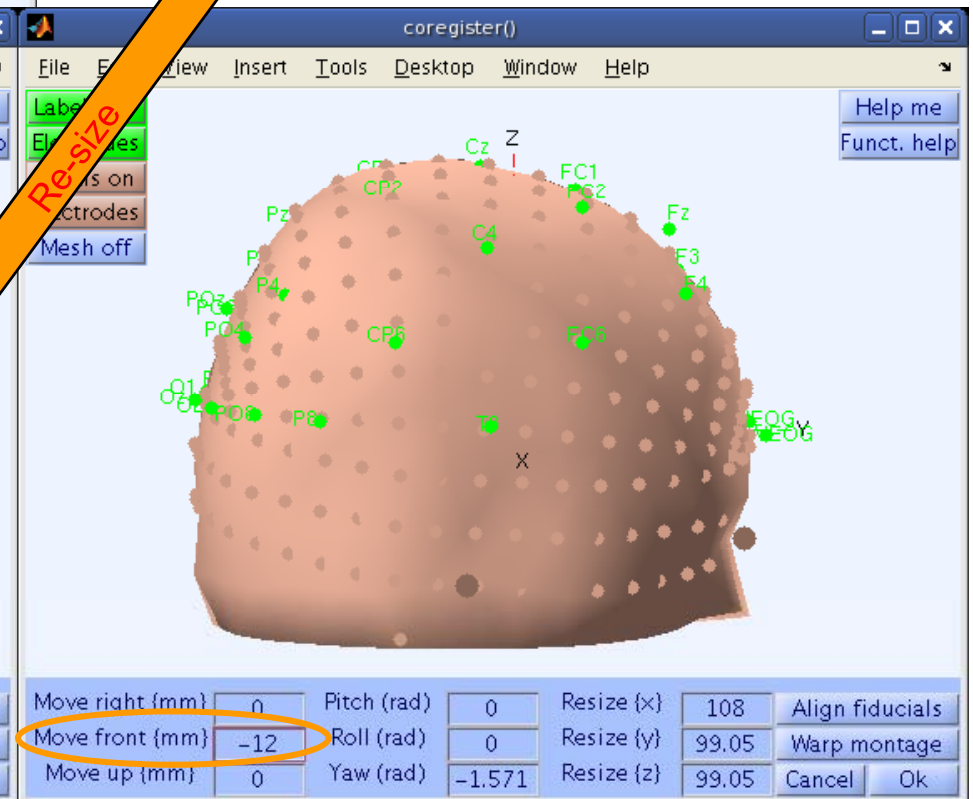
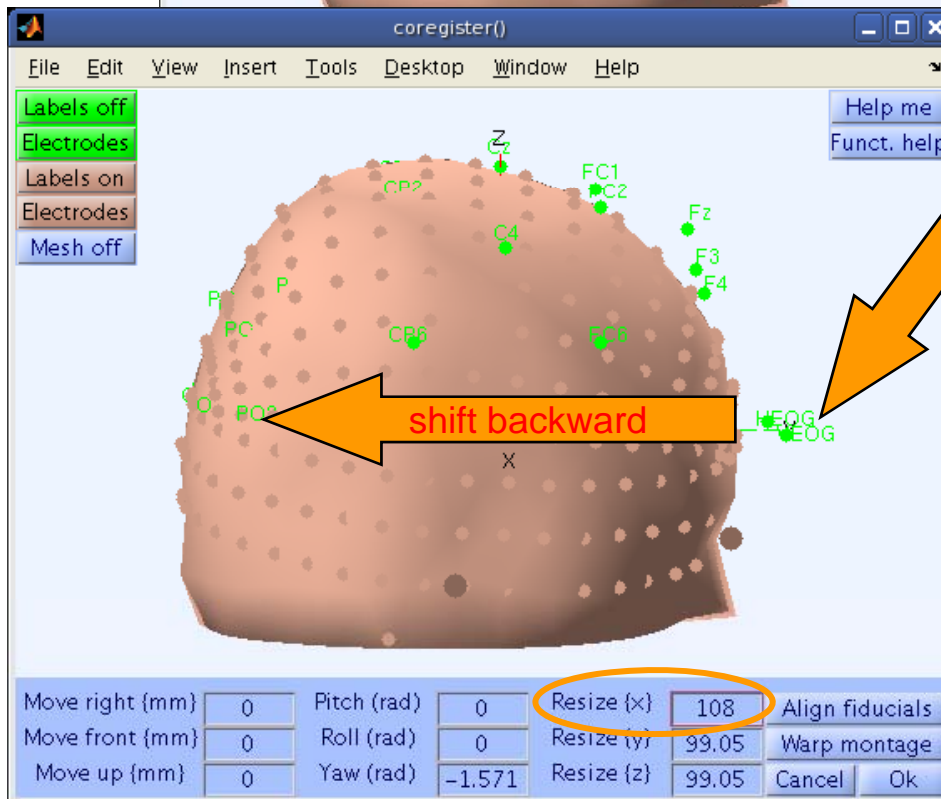
Perform translation of electrode positions



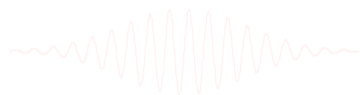
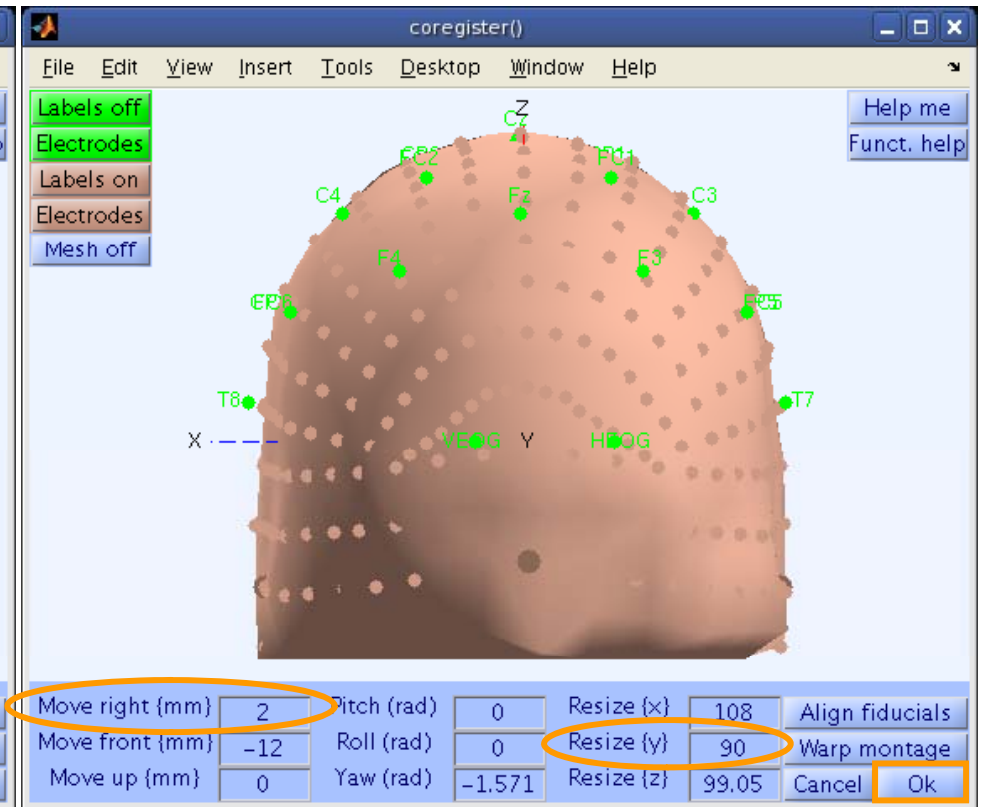
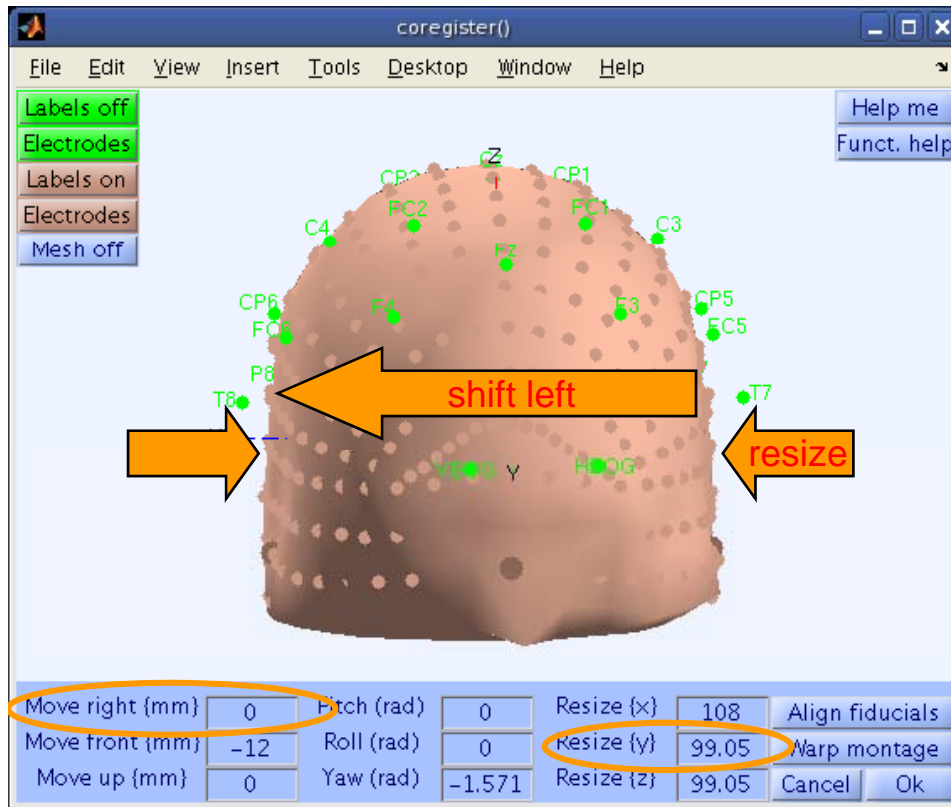
Requires a shift toward back of the head

AND

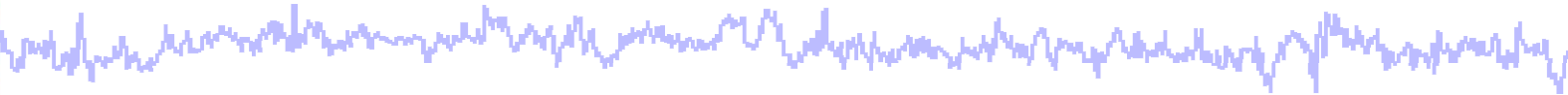
an expansion along the X-axis



Perform translation of electrode positions



Confirm electrode transformation



Dipole fit settings - pop_dipfit_settings()

Head model (click to select): Spherical Four-Shell (BESA), Boundary Element Model (MNI), CTF MEG, Custom model files

Head model file: g:\lab\plugins\dipfit2.2\standard_BEM\standard_vol.mat

Output coordinates: MNI

MRI file: g:\lab\plugins\dipfit2.2\standard_BEM\standard_mri.mat

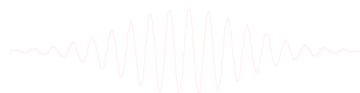
Model template channel locations file: g:\lab\plugins\dipfit2.2\standard_BEM\elec\standard_1005.elc

Co-register chan. locs. with head model: **0 -1.570796 108 90 99.05485** Manual Co-Reg.

Channels to omit from dipole fitting: [] No Co-Reg.

Note: For EEG, check that the channel locations are on the surface of the head model (To do this: 'Set head radius' to about 85 in the channel editor).

Buttons: Cancel, Help, Ok



Alternatively, warp to standard montage



coregister()

File Edit View Insert Tools Desktop Window Help

Labels off
Electrodes
Labels on
Electrodes
Mesh off

Move right (mm) 0 Pitch (rad) 0 Resize (x) 99.05 Align fiducials
Move front (mm) 0 Roll (rad) 0 Resize (y) 99.05 Warp montage
Move up (mm) 0 Yaw (rad) 0 Resize (z) 99.05 Cancel Ok

Check to see that electrodes are correctly matched

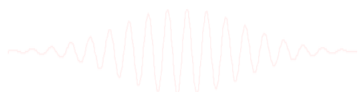
Select corresponding channels to pair

Plot new montage	Plot ref montage
1 - VEOG	1 - LPA
2 - F3 -> 21 - F3	2 - RPA
3 - Fz -> 23 - Fz	3 - Nz
4 - F4 -> 25 - F4	4 - Fp1
5 - HEOG	5 - Fpz
6 - FC5 -> 31 - FC5	6 - Fp2
7 - FC1 -> 33 - FC1	7 - AF9
8 - FC2 -> 35 - FC2	8 - AF7
9 - FC6 -> 37 - FC6	9 - AF5
10 - T7 -> 41 - T7	10 - AF3
11 - C3 -> 43 - C3	11 - AF1
12 - C4 -> 47 - C4	12 - AFz
13 - Cz -> 45 - Cz	13 - AF2
14 - T8 -> 49 - T8	14 - AF4
15 - CP5 -> 53 - CP5	15 - AF6
16 - CP1 -> 55 - CP1	16 - AF8
17 - CP2 -> 57 - CP2	17 - AF10
18 - CP6 -> 59 - CP6	18 - F9
19 - P7 -> 63 - P7	19 - F7
20 - P3 -> 65 - P3	20 - F5
21 - Pz -> 67 - Pz	21 - F3 -> 2 - F3
22 - P4 -> 69 - P4	22 - F1
23 - P8 -> 71 - P8	23 - Fz -> 3 - Fz
24 - PO7 -> 74 - PO7	24 - F2
25 - PO3 -> 76 - PO3	25 - F4 -> 4 - F4
26 - POz -> 78 - POz	26 - F6
27 - PO4 -> 80 - PO4	27 - F8
28 - PO8 -> 82 - PO8	28 - F10
29 - O1 -> 84 - O1	29 - FT9
30 - Oz -> 85 - Oz	30 - FT7
31 - O2 -> 86 - O2	31 - FC5 -> 6 - FC5
	32 - FC3

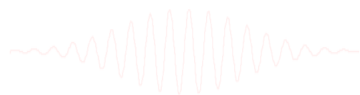
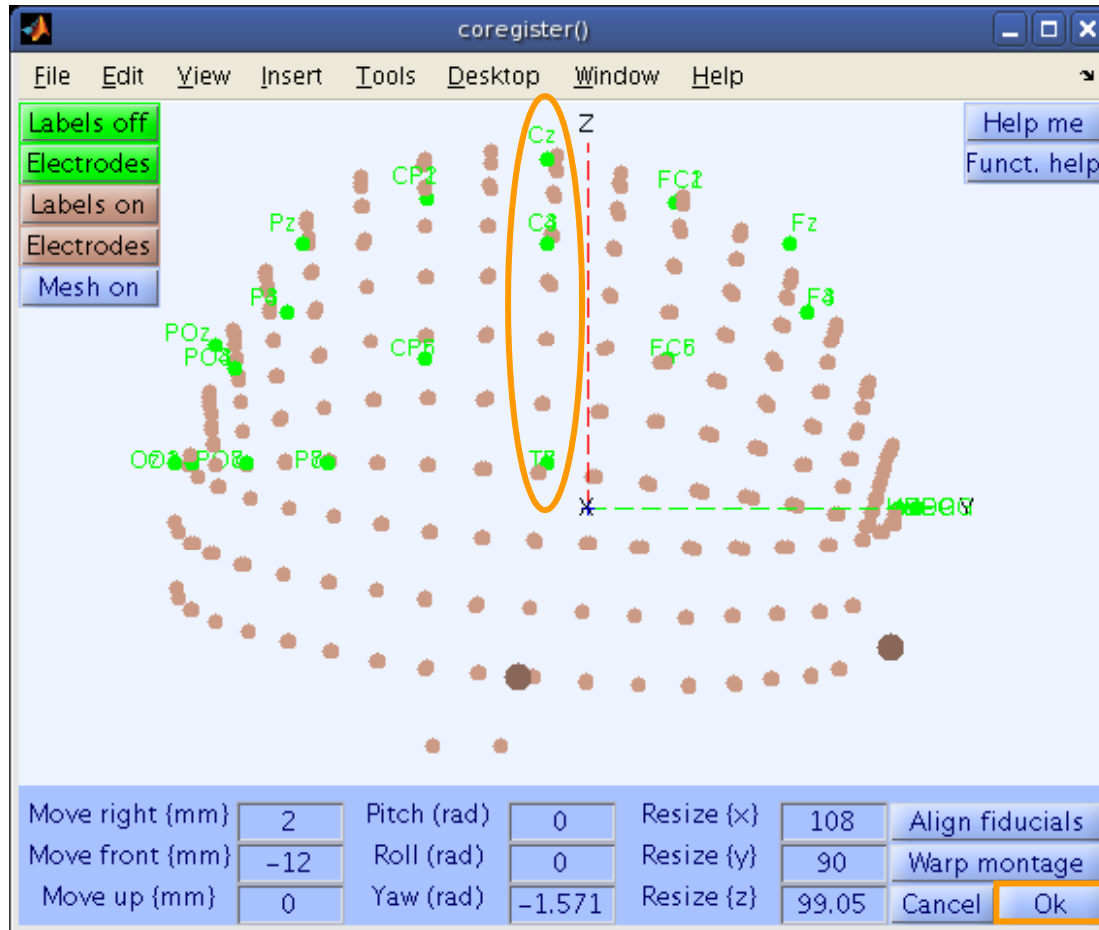
Pair channels
Clear all pairs
Cancel

Clear this pair
Auto select
Ok

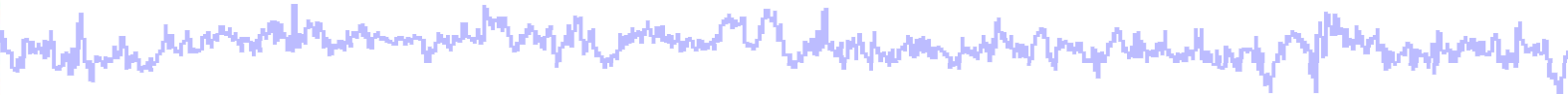
stats toolbox required for warping



Check coregistration with model



DIPFIT and model co-registration



Task 1

Co-register electrodes with model

Task 2

Autofit equivalent dipoles

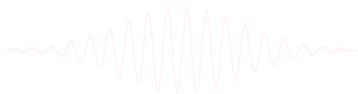
Task 3

Fine fit options

Task 4

3D *headplot()* co-registration

Exercise...

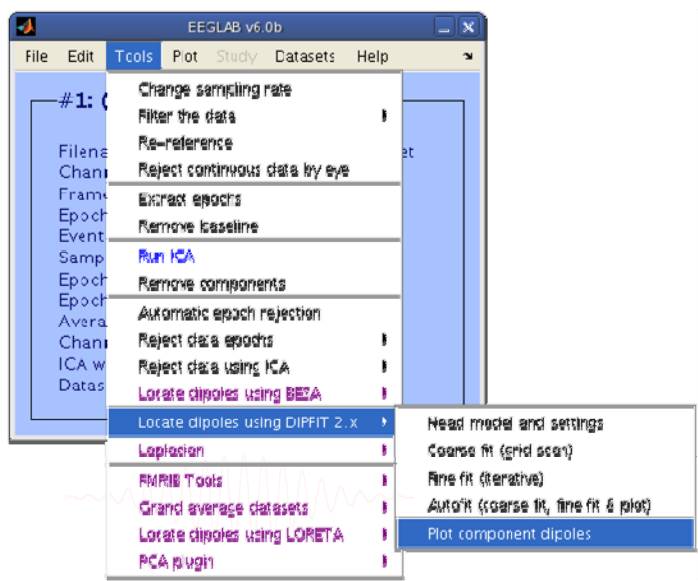
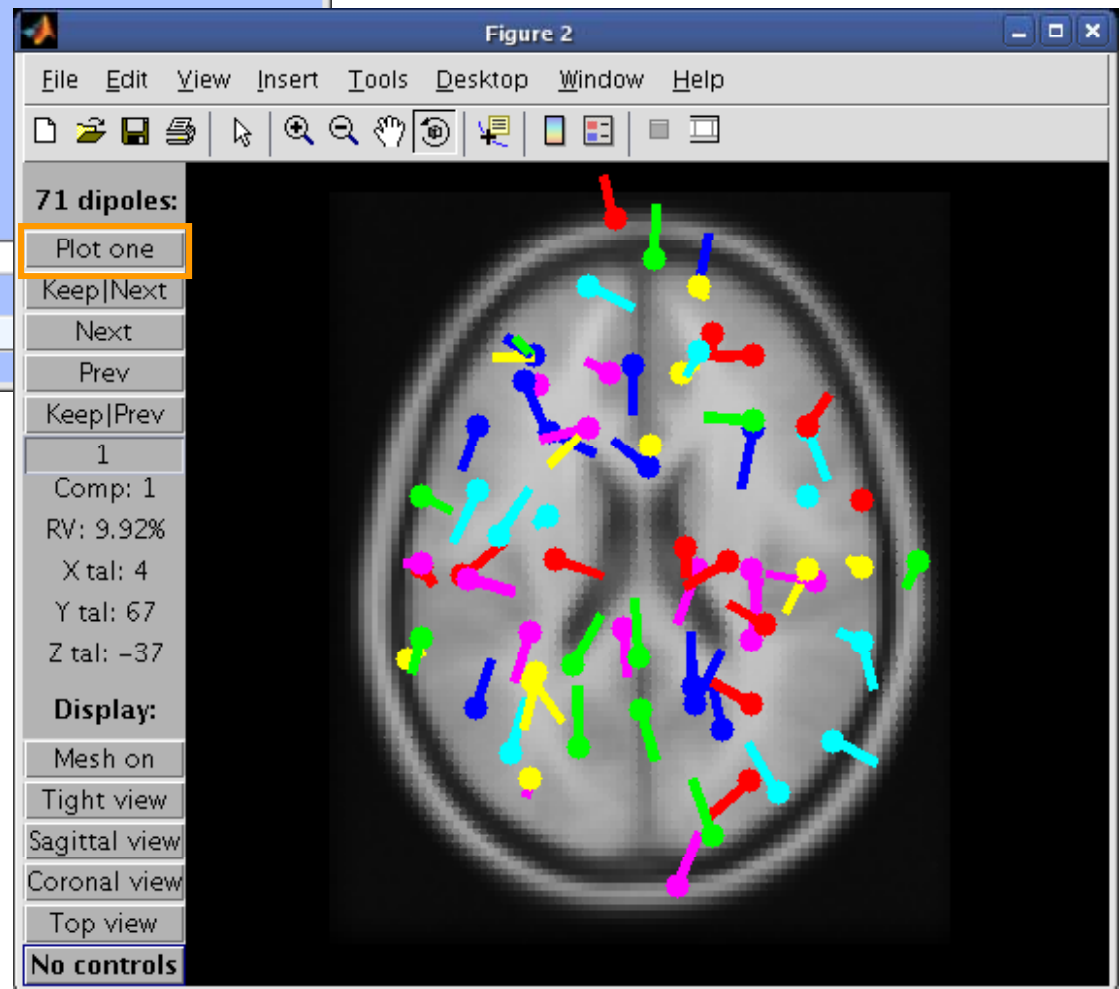
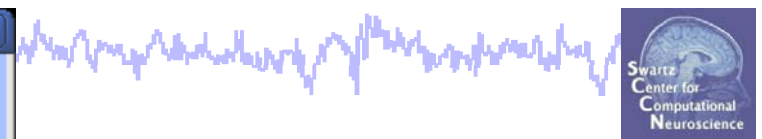
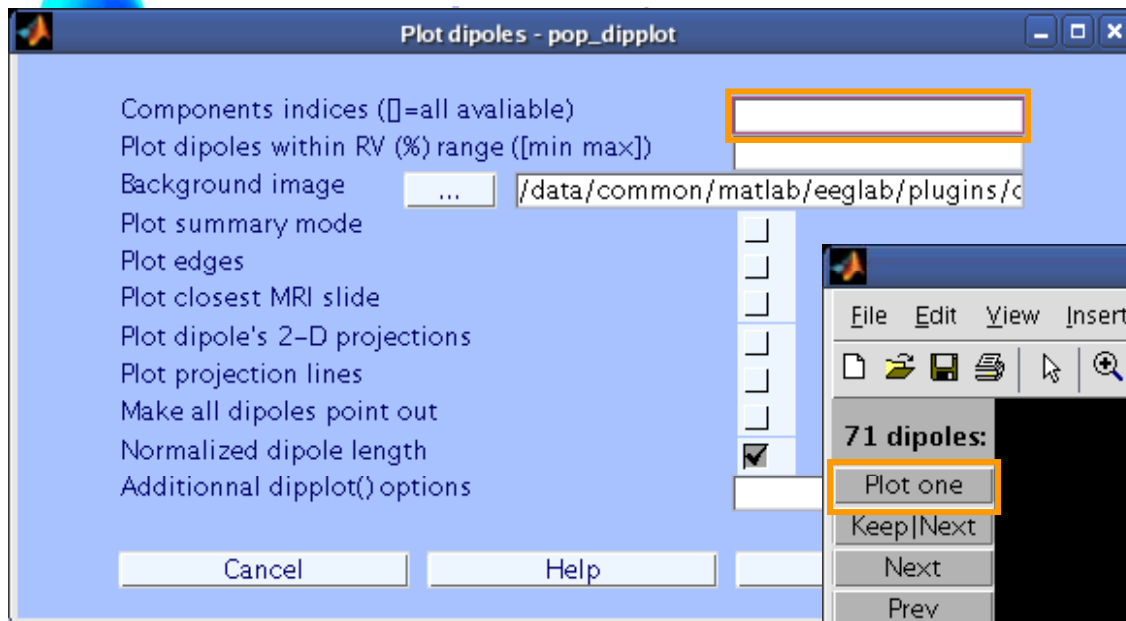


Autofit equivalent dipoles

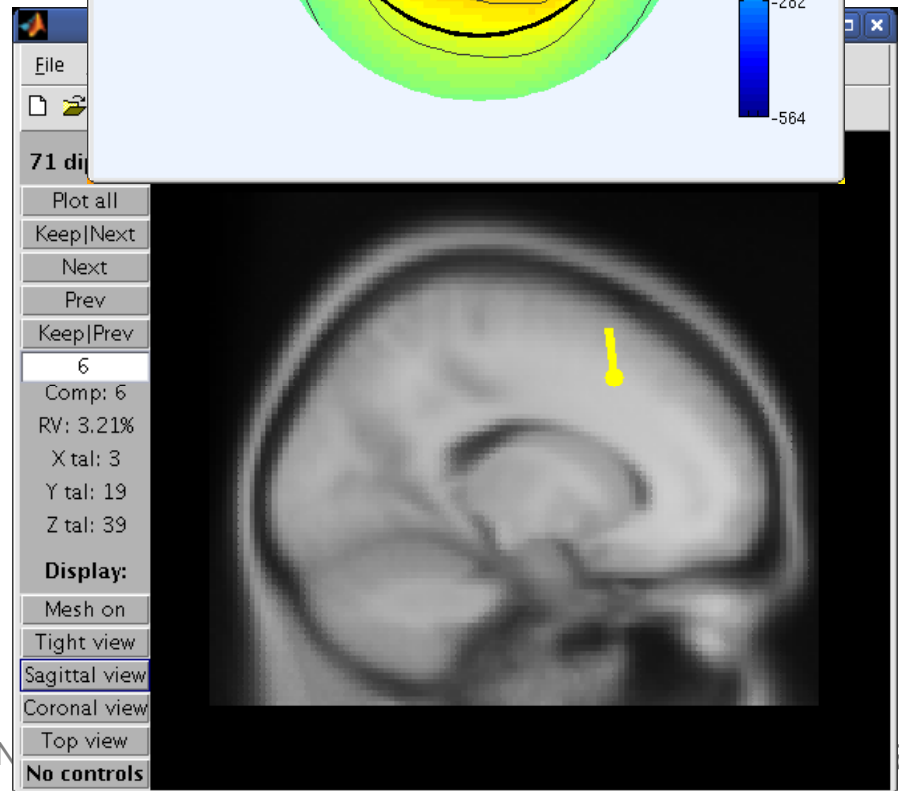
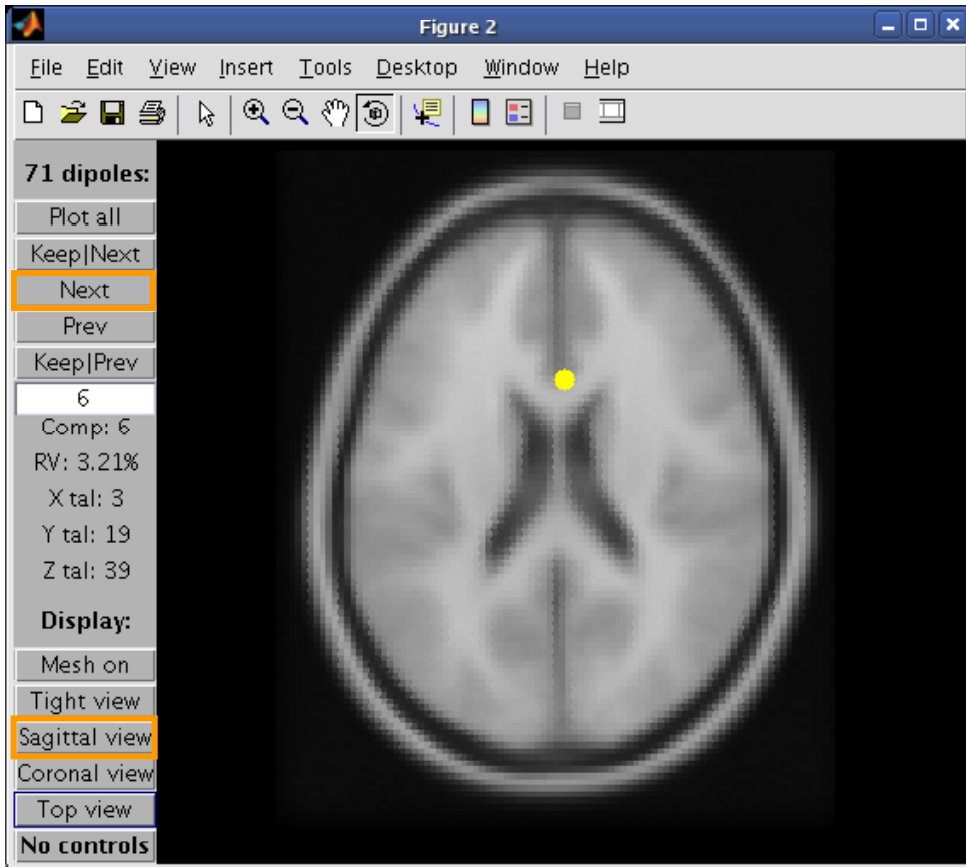
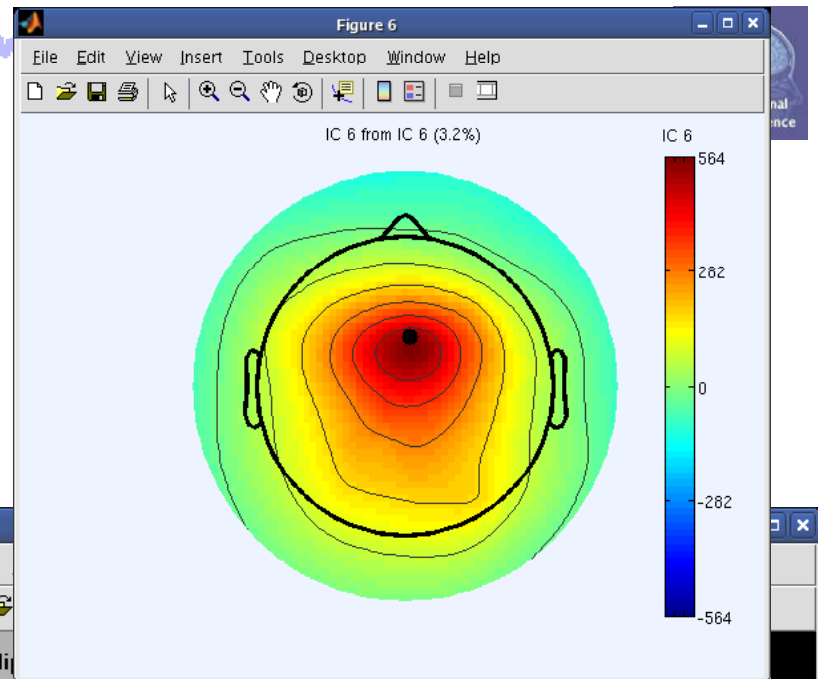


The screenshot shows the EEGLAB v6.0b interface. The 'Tools' menu is open, and the 'Locate dipoles using DIPFIT 2.x' option is selected. A sub-menu is displayed with 'Autofit (coarse fit, fine fit & plot)' highlighted. An orange arrow points from this menu item to the 'Fit multiple ICA components -- pop_multifit()' dialog box. In this dialog box, the 'Component indices' field is set to '1:71' and is circled in orange. Other settings include 'Rejection threshold RV (%)' at 100, and checkboxes for 'Remove dipoles outside the head', 'Fit bilateral dipoles (check)', and 'Plot resulting dipoles (check)'. The 'dipplot() plotting options' are set to 'normlen' and 'on'. Buttons for 'Cancel', 'Help', and 'Ok' are visible at the bottom of the dialog.

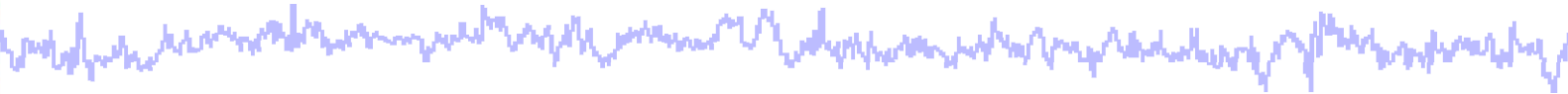
Plot dipoles



Scroll through dipoles



DIPFIT and model co-registration



Task 1

Co-register electrodes with model

Task 2

Autofit equivalent dipoles

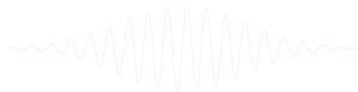
Task 3

Fine fit options

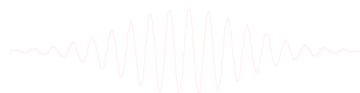
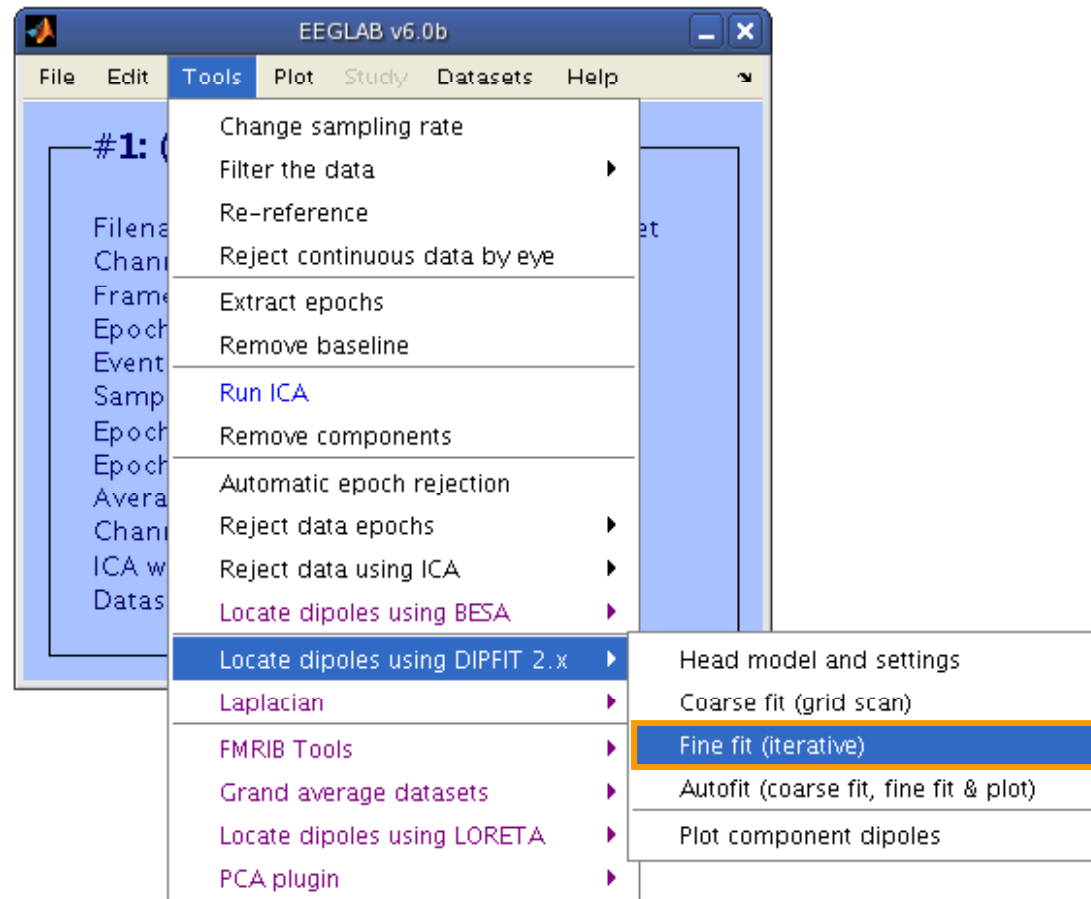
Task 4

3D *headplot()* co-registration

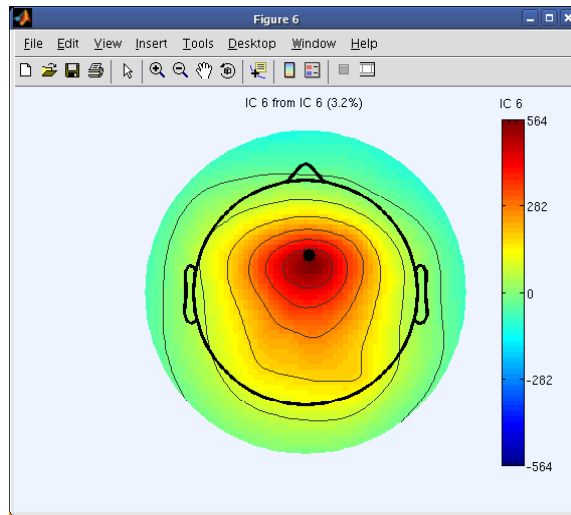
Exercise...



Fine fit options in DIPFIT



Fine fit menu



Manual dipole fit -- pop_dipfit_nonlinear()

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

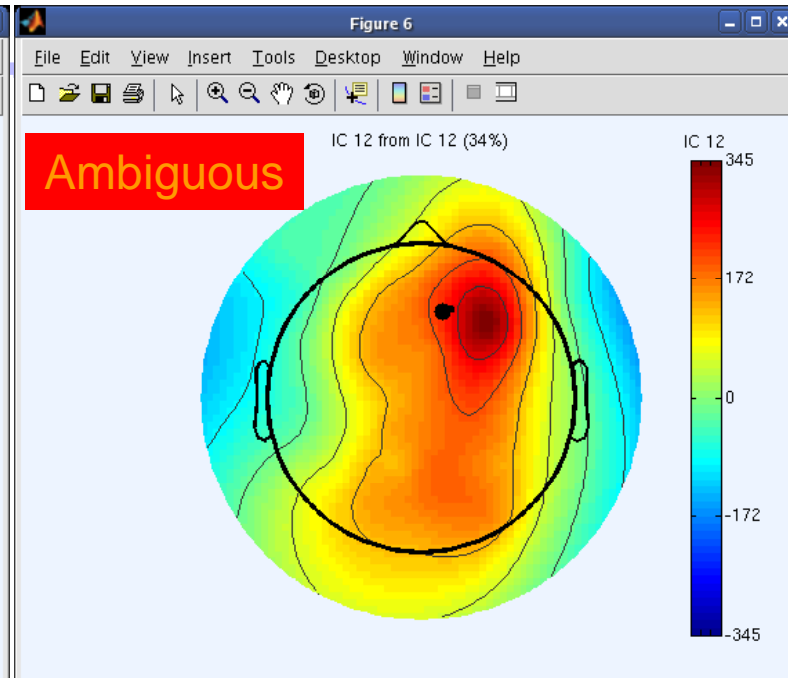
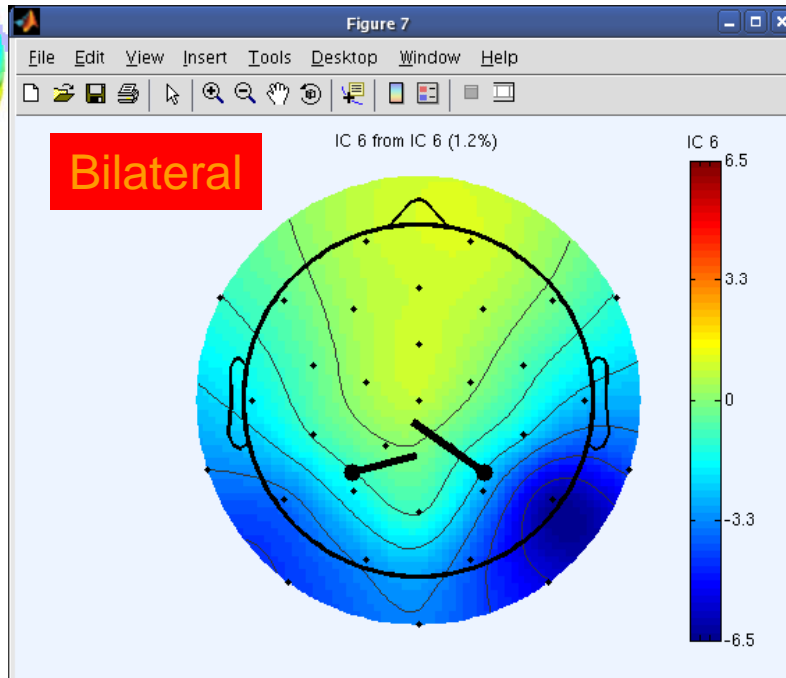
dipole	fit	position	moment	
#1	<input checked="" type="checkbox"/>	28.222 -2.401 37.331	2.380 475942.653 3819304.288	Flip (in out)
#2	<input type="checkbox"/>	0.000 0.000 0.000	0.000 0.000 0.000	Flip (in out)

Symmetry constrain for dipole ...

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

Cancel Help Ok

Bilateral dipoles



Manual dipole fit -- pop_dipfit_nonlinear()

Component to fit: Residual variance = 1.23%

dipole	fit	position	moment	
#1	<input checked="" type="checkbox"/>	-35.066 -32.492 -4.684	32271.382 46141.284 5880.224	Flip (in out)
#2	<input checked="" type="checkbox"/>	-35.066 32.492 -4.684	1005.419 -38050.427 14094.824	Flip (in out)

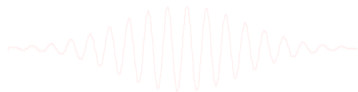
Symmetry constrain for dipole ...

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



EEG.dipfit structure



```
>> EEG.dipfit.model
```

```
ans =
```

```
1x33 struct array with fields:
```

```
posxyz
```

```
momxyz
```

```
rv
```

```
active
```

```
select
```

```
>> EEG.dipfit.model(1)
```

```
ans =
```

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

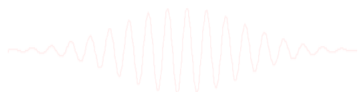
```
posxyz: [1x3 double]
```

```
momxyz: [1x3 double]
```

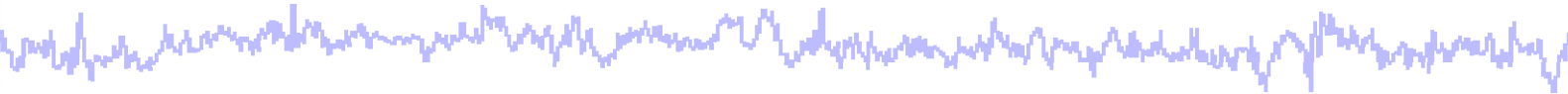
```
      rv: 0.0288
```

```
active: 1
```

```
select: 1
```



DIPFIT and model co-registration



Task 1

Co-register electrodes with model

Task 2

Autofit equivalent dipoles

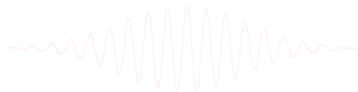
Task 3

Fine fit options

Task 4

3D *headplot()* co-registration

Exercise...



Plot scalp maps in 3D



EEGLAB v6.0b

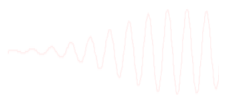
File Edit Tools **Plot** Study Datasets Help

#1: (no d...
Filename: ...
Channels pe...
Frames per e...
Epochs
Events
Sampling rat...
Epoch start (...
Epoch end (s...
Average refe...
Channel loca...
ICA weights
Dataset size

Channel locations
Channel data (scroll)
Channel spectra and maps
Channel properties
Channel ERP image
Channel ERPs
ERP map series
Sum/Compare ERPs
Component activations (scroll)
Component spectra and maps
Component maps
Component properties
Component ERP image
Component ERPs
Sum/Compare comp. ERPs
Data statistics
Time-frequency transforms
Average time-frequency
Cluster dataset ICs

In 2-D
In 3-D

Headplot() warning
headplot() must generate a spline file the first time it is called or after changes in the channel location file. You must also co-register your channel locations with the head template.
Ok



Headplot co-registration



Component head plot(s) -- pop_headplot()

Co-register channel locations with head mesh and compute a mesh spline file (done only once)

Use the following spline file or structure

Or (re)compute a new spline file named:

3-D head mesh file

Mesh associated channel file

Talairach-model transformation matrix

/home/julie/S01_attend1_pos1.spl

mheadnew.mat

mheadnew.xyz

Browse

Help

Browse

Help

Browse

Browse

Manual coreg.

1:31

Components of dataset:

Ok

coregister()

File Edit View Insert Tools Desktop Window Help

Labels off

Electrodes

Labels on

Electrodes

Mesh off

Help me

Funct. help

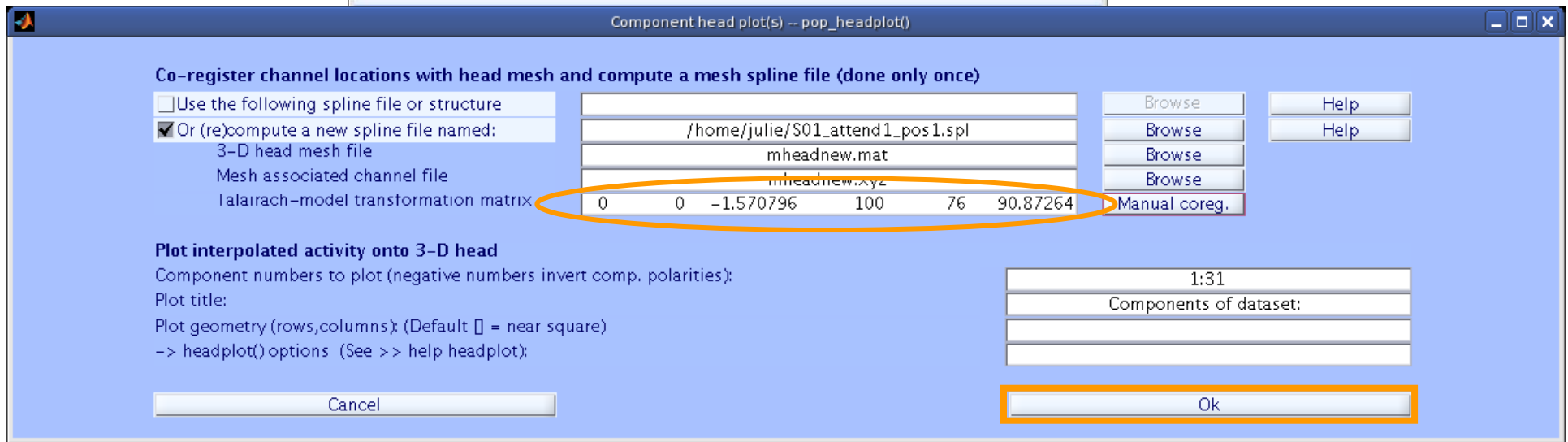
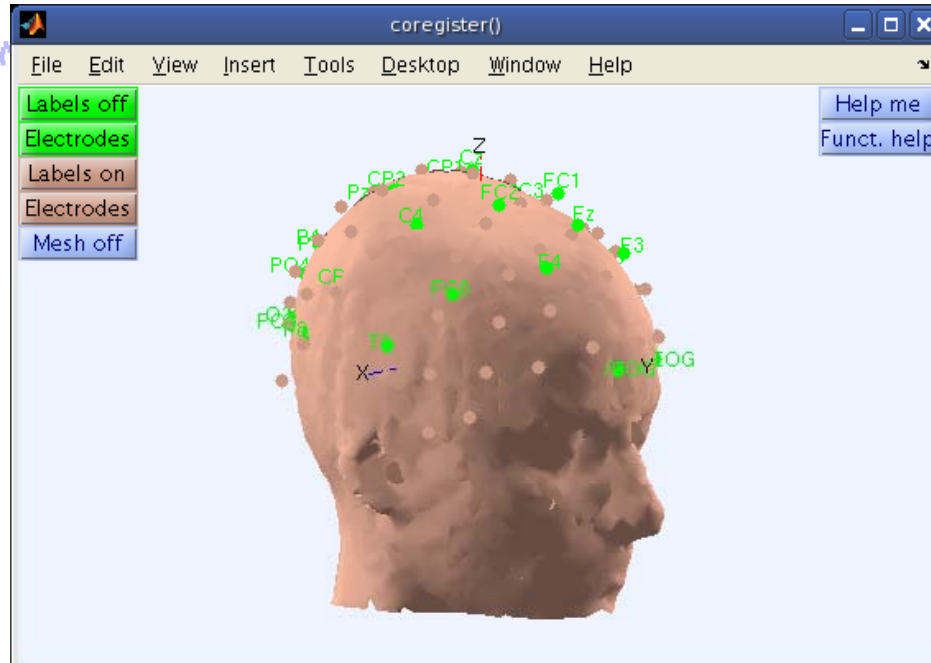
Move right {mm} 0 Pitch (rad) 0 Resize {x} 90.87 Align fiducials

Move front {mm} 0 Roll (rad) 0 Resize {y} 90.87 Warp montage

Move up {mm} 0 Yaw (rad) 0 Resize {z} 90.87 Cancel Ok

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

Confirm headplot co-registration



Spline file in EEG structure



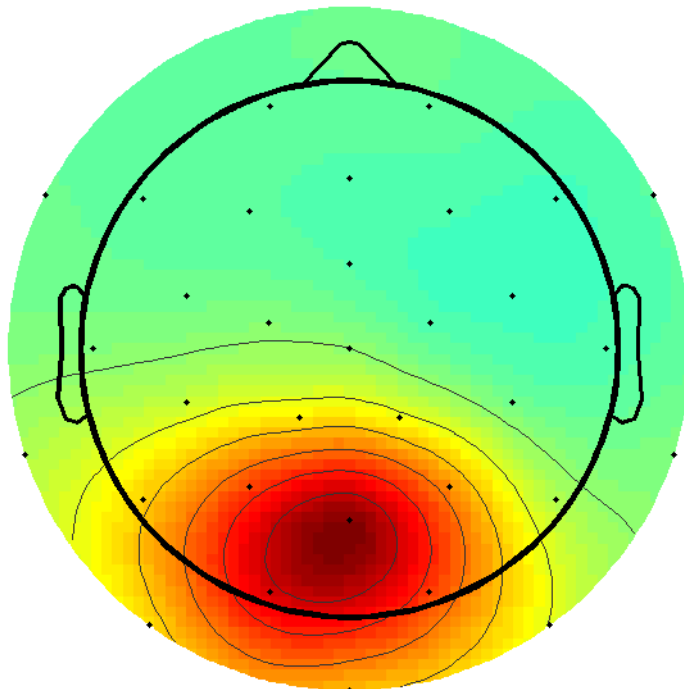
```
>> EEG
```

```
...
```

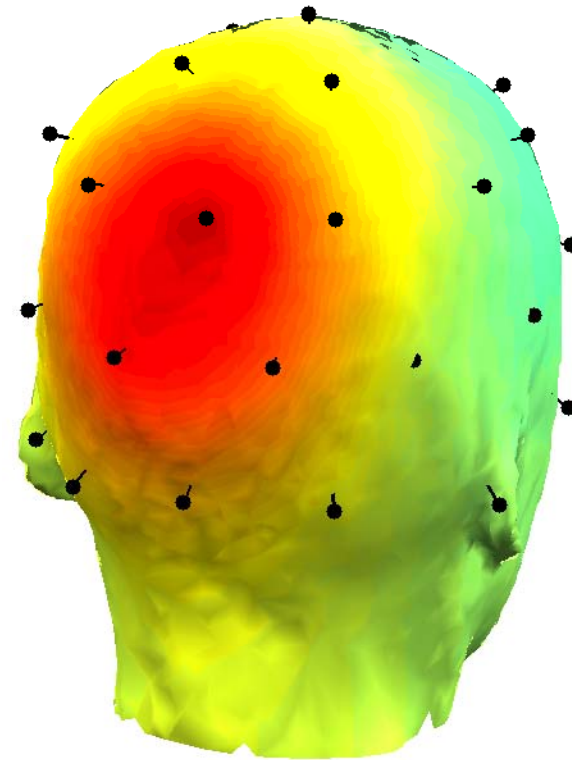
```
icasplinefile = 'C:\...\EEGLAB_WORKSHOP\faces_3.spl'
```

```
...
```

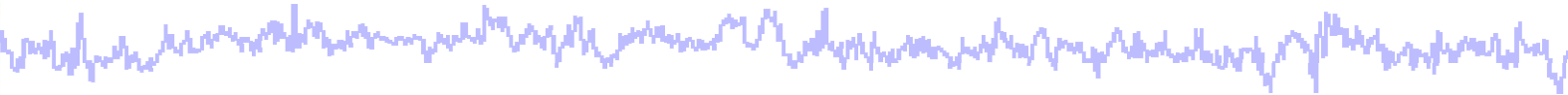
2D scalp map for IC 12



3D scalp map for IC 12



Exercise



- **Novice**
 - Plot dipoles from the GUI and scroll through components individually,
 - Try all viewing parameters
- **Intermediate / Advanced**
 - In the Finefit menu, try fitting a bilateral dipole, what happens to the residual variance?
 - Co-register the head model for 3D scalp map plotting. Then plot some ICs in 3D.
 - Can you gain any further insight about source projections using this display?

