Solve the forward problem using realistic head models (BEM)

Mesh generation

Sensor Localization

Simple Map

Signal Processing

Source Image

EEG/MEG

Zeynep Akalin Acar, & Scott Makeig '06

MRI

Segmentation
Brain Electrophysiology

1960 ➔ Response averaging

1993 ➔

ERP ↔ EEG ↔ LFP ↔ #Spikes

2000 ➔

S. Makeig, TINS 2002
M I C R O

BRAIN \(\rightarrow\) BEHAVIOR

SPIKES

LFP

ECOG

EEG

MACRO

ERP

Recorded !?

RT

\(\sim 1 \text{ Hz}\)

\(\sim 1 \text{ MHz}\)

\(\sim 1,000,000 \text{ GHz}\)
Studying ‘cognitive perception’ using ERPs
But, this linear decomposition is veridical if & only if:

1. The Average appears in each trial.
2. The “Background” is not perturbed in other ways by the time locking events.

Not True / Not Defined

S. Makeig 2004
Conceptual legacies of single sensor response/rate averaging

- Reduction of the time series data at each channel to a **single average response time series**.

- Reduction of the data collected at each channel to an **isolated spatial point process**.

How to capture more of the event-related brain dynamics contained in high-density EEG data?