On the functional role and laminar profile of the sensory alpha rhythm

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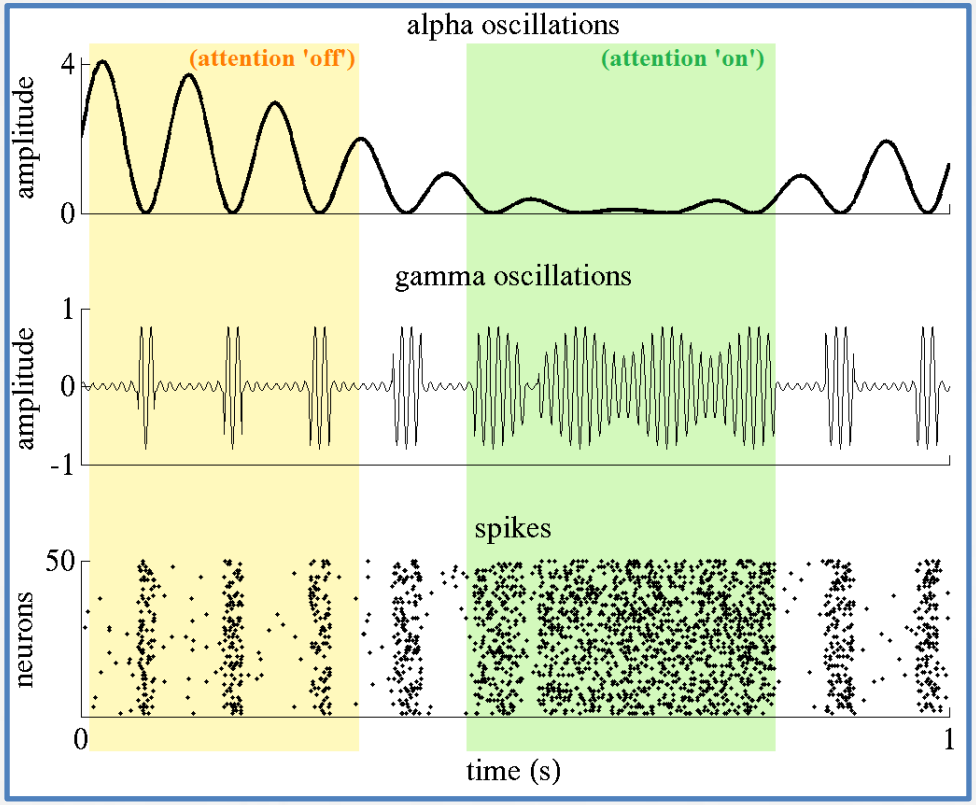
Hypothesis

- Alpha reflects (phasic) inhibition
- Faster rhythms and spikes reflect neuronal processing



Jensen and Mazaheri (2010) Front Hum Neurosci

Klimesch et al. (2007) Brain Res Rev

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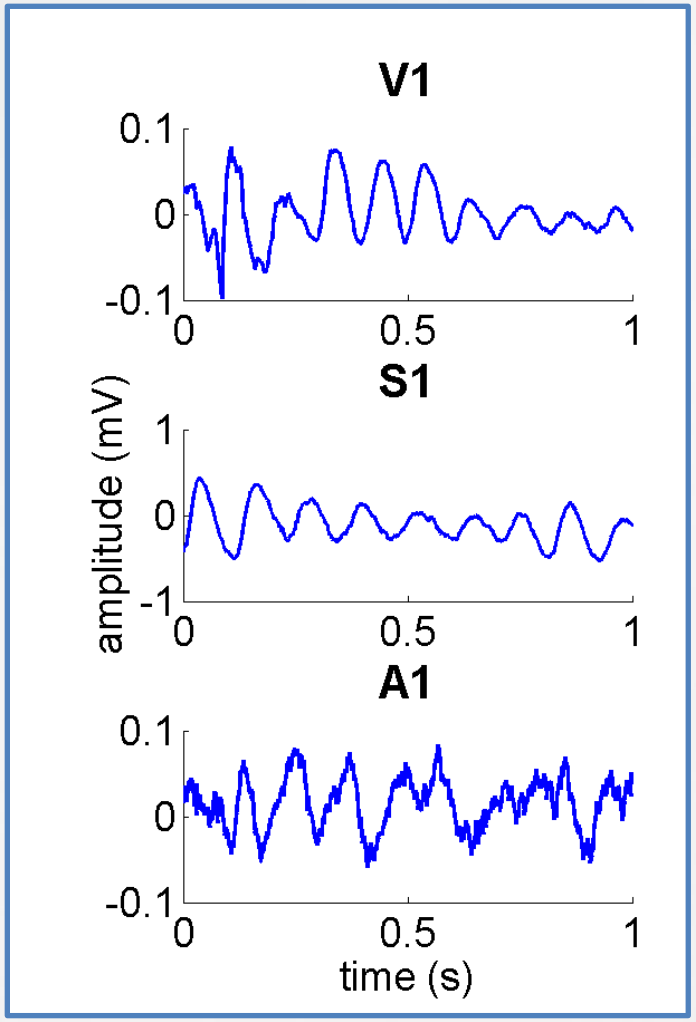
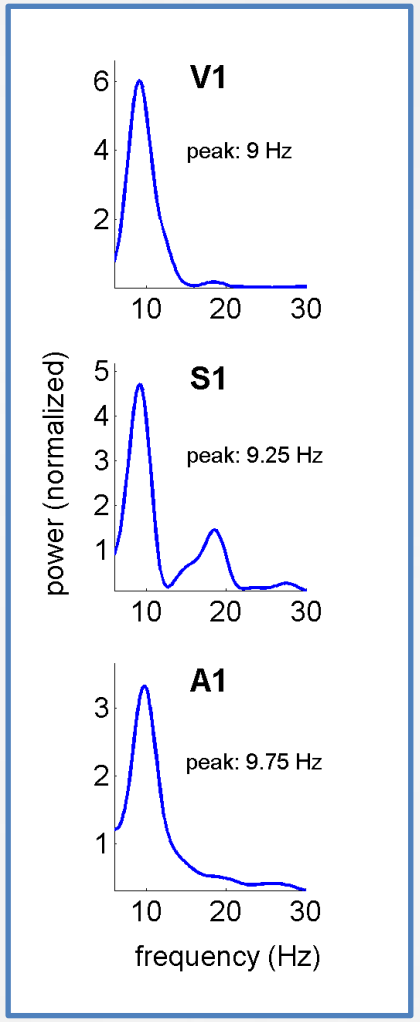
Alpha in the monkey sensory cortex





Haegens & Schroeder (in preparation)

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In which layer does alpha originate?

- Previous work suggests alpha is prominent in infragranular layers:
  - » Maier et al. (2011) J Neurosci
  - » Buffalo et al. (2011) PNAS
  - » Spaak et al. (2012) Current Biology

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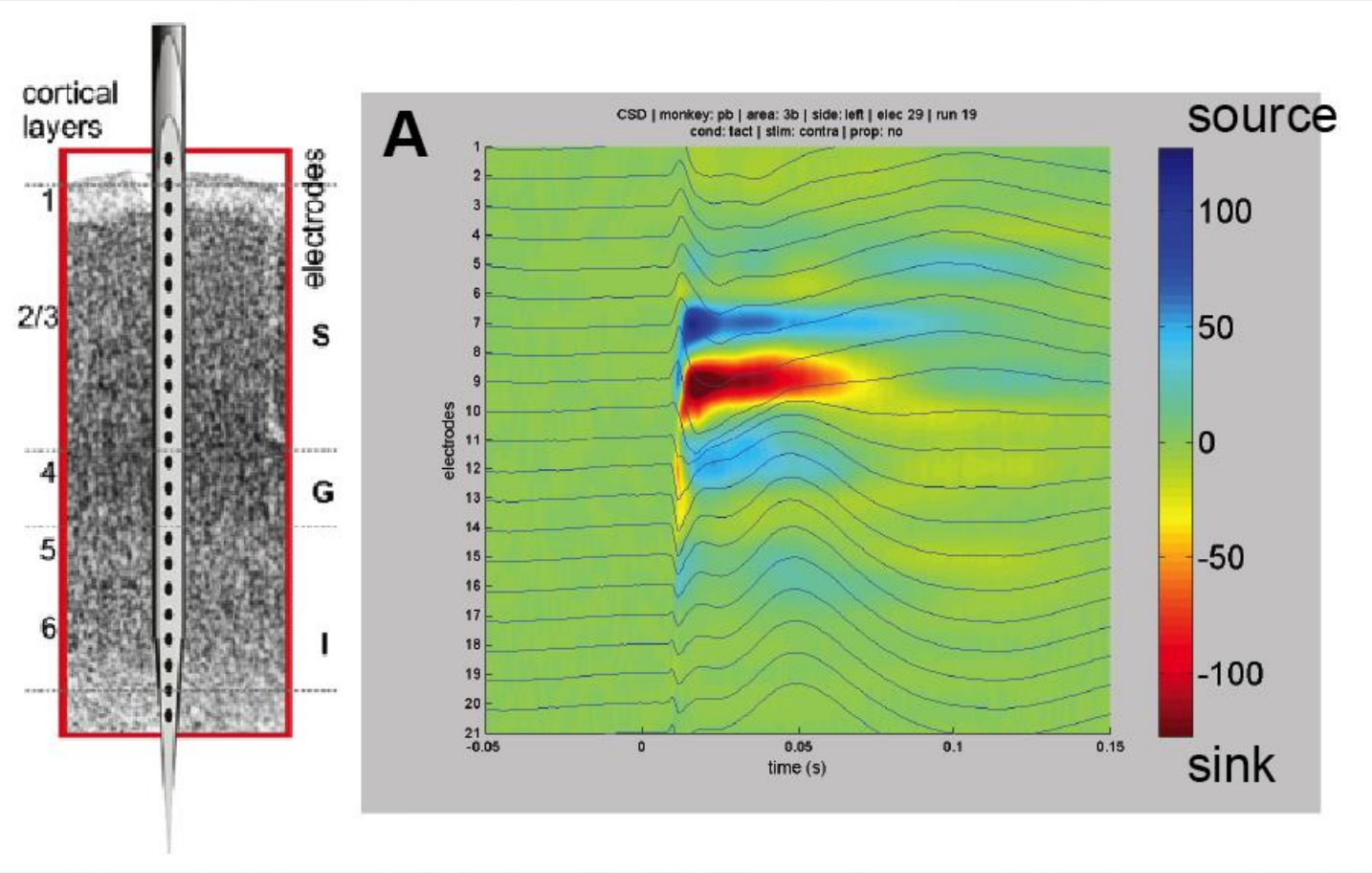
Laminar recordings



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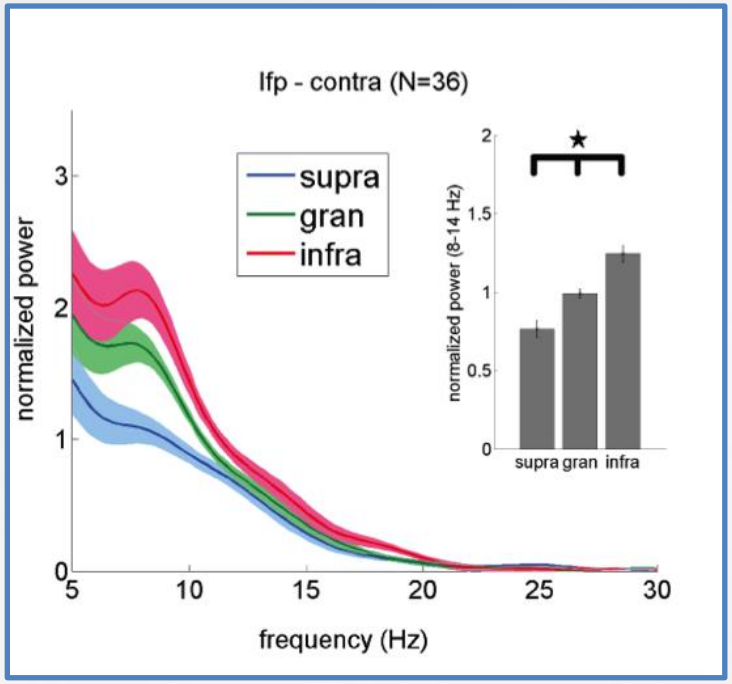
Laminar profile of alpha – S1



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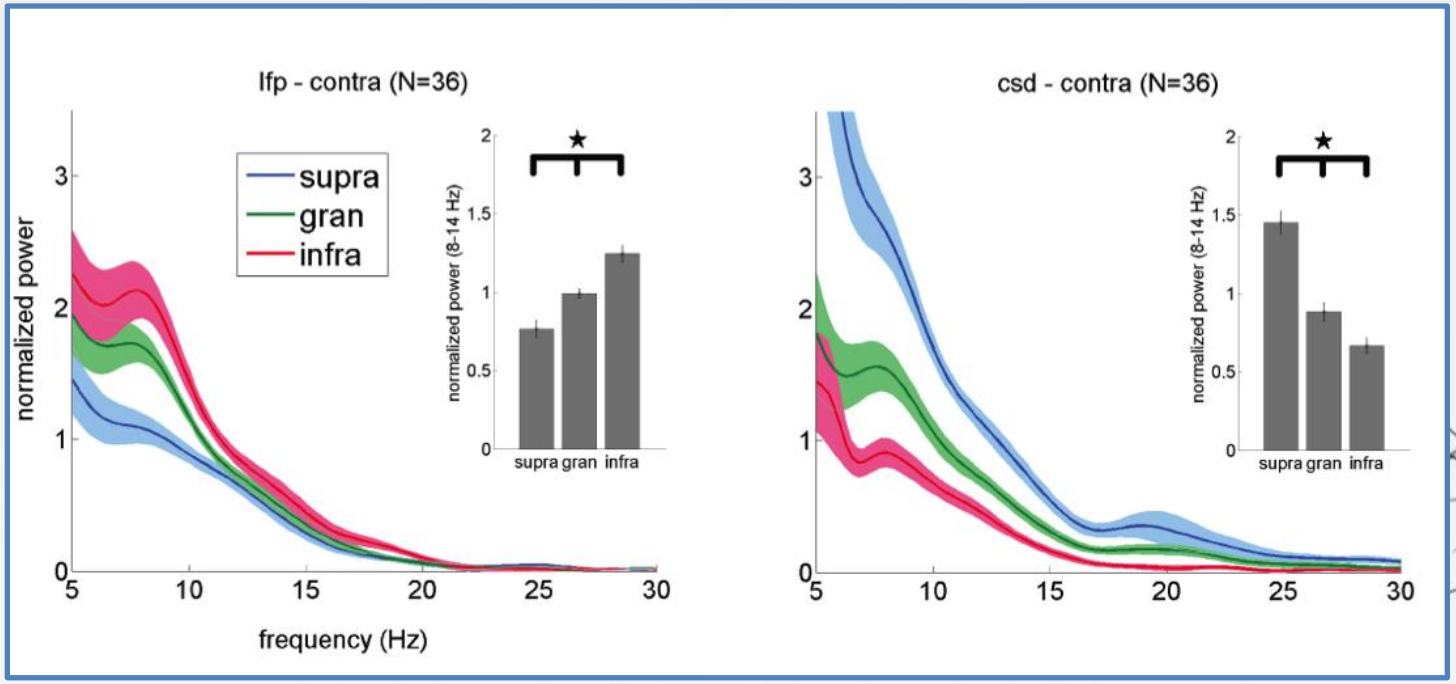
Laminar profile of alpha – S1



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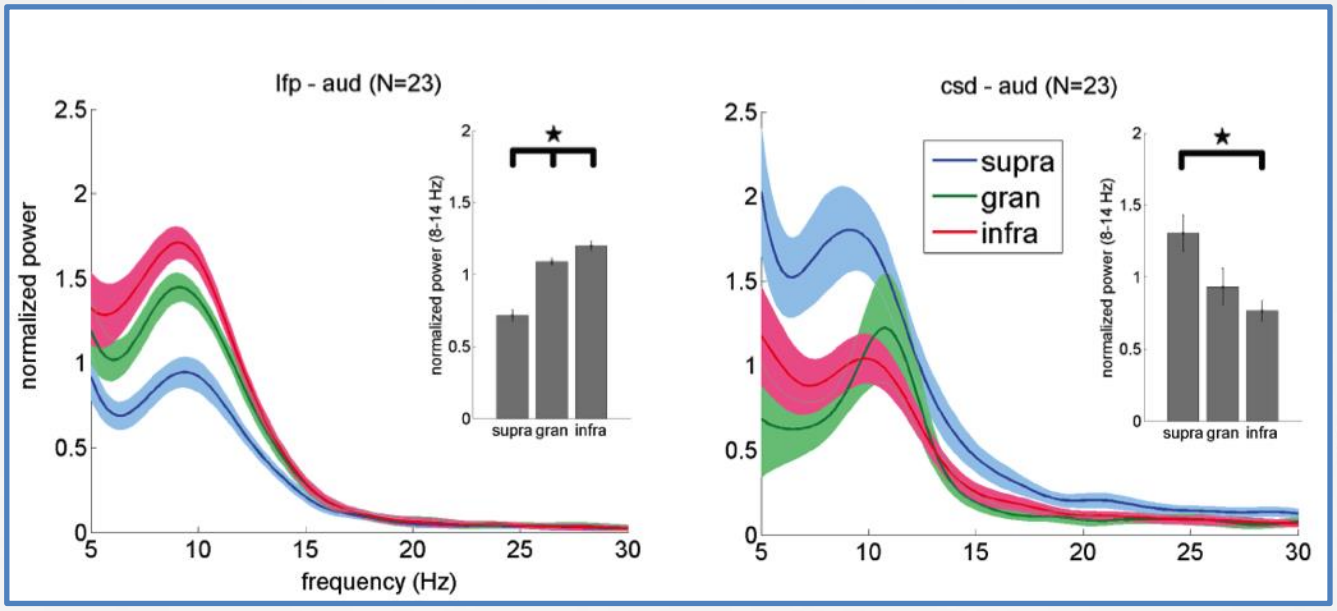
Confirmation in V1



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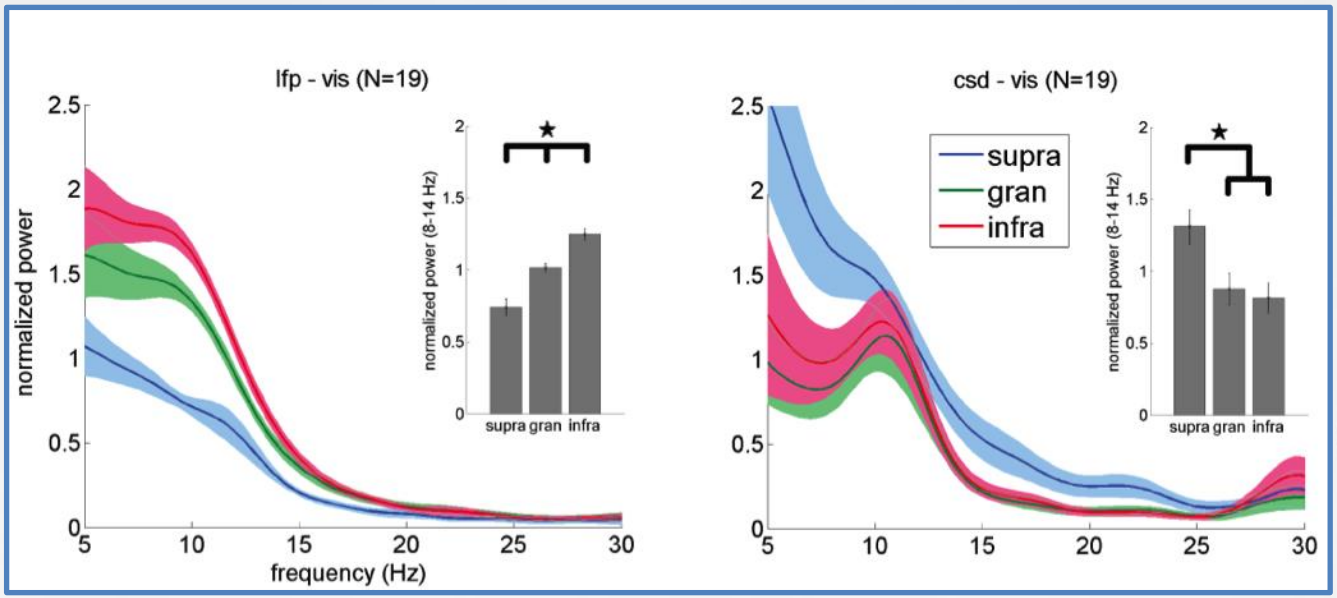
Confirmation in A1



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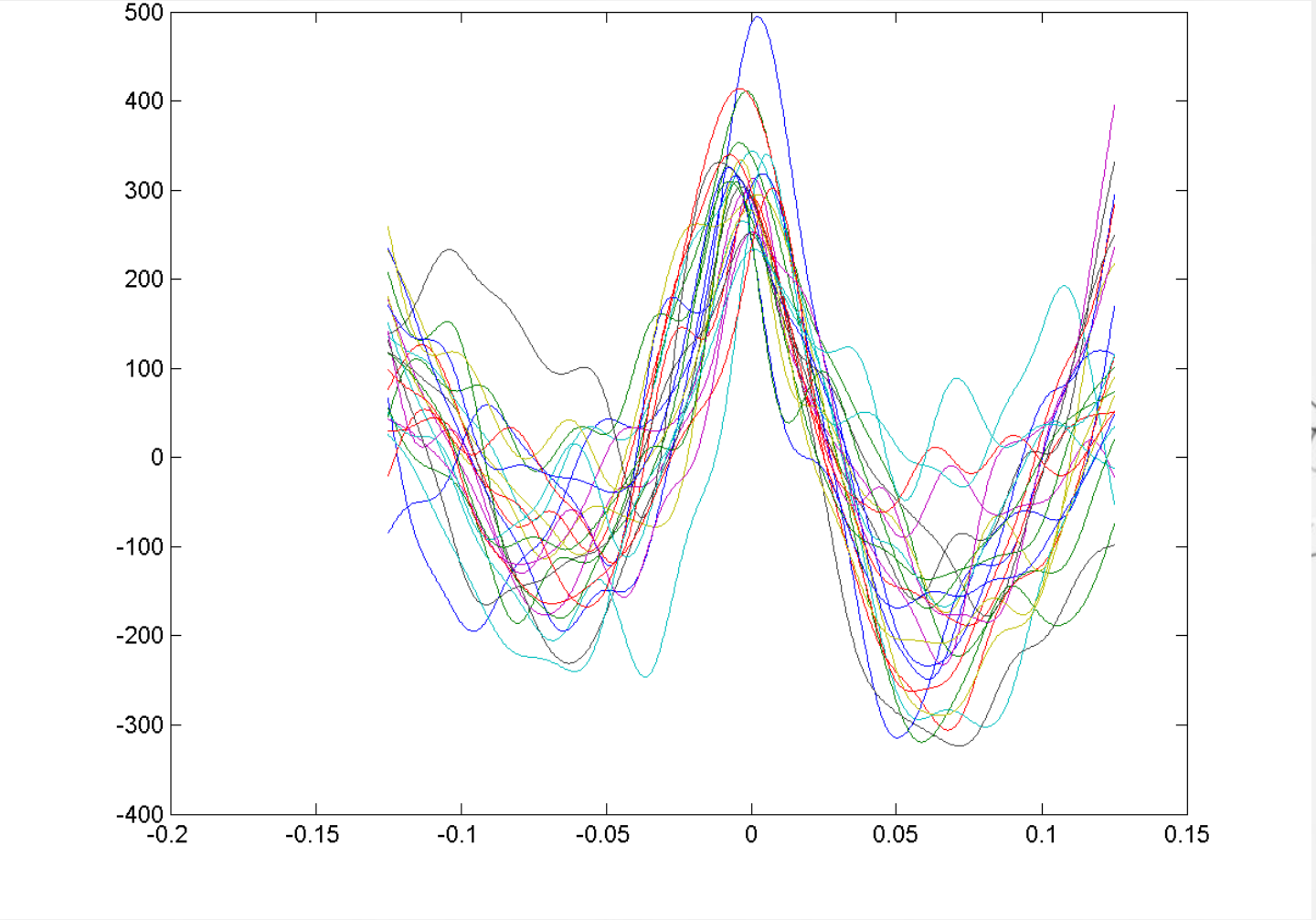
Alpha phase-realigned LFP



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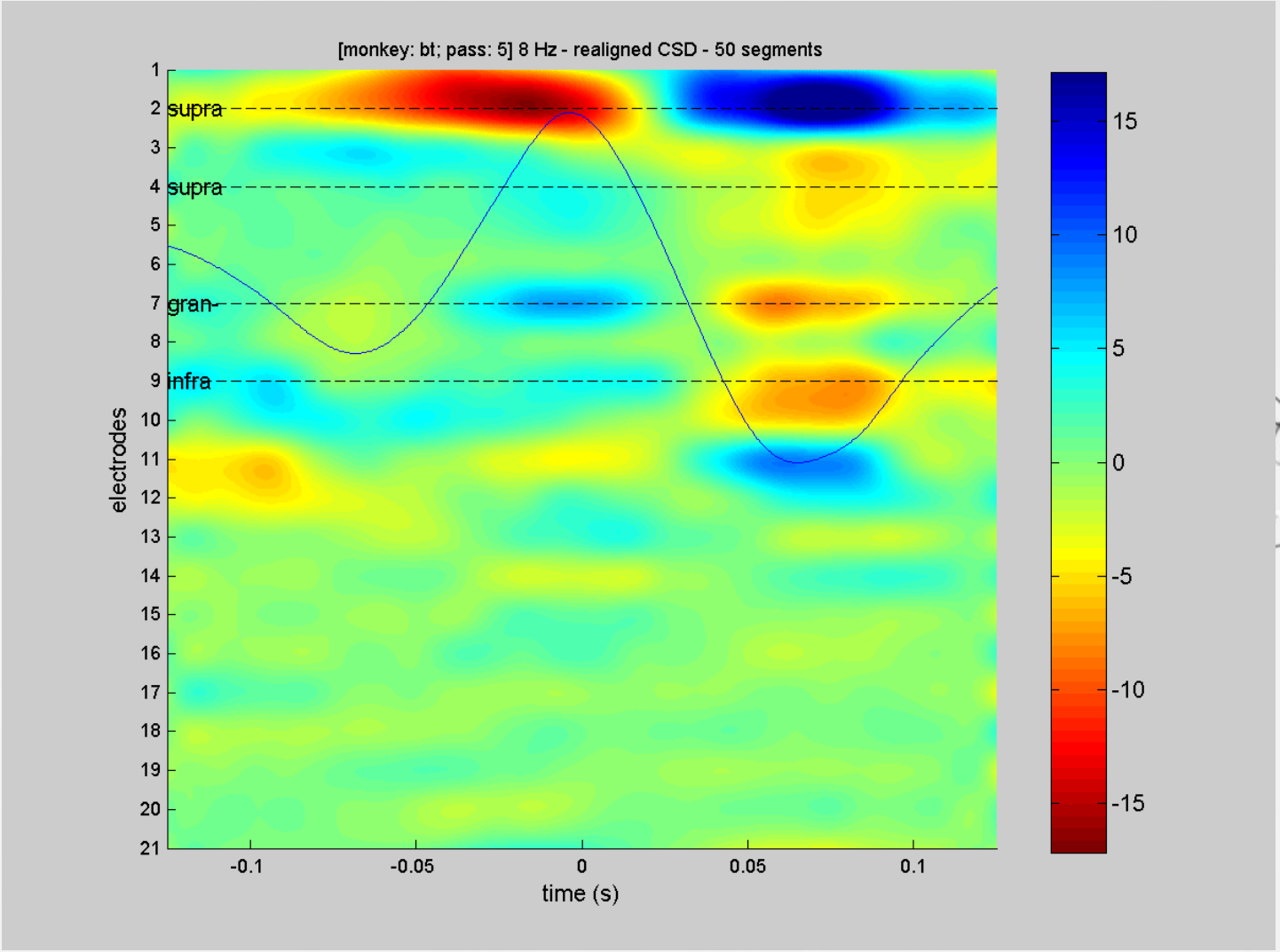
Alpha phase-realigned CSD



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Alpha generators in all layers

- LFP maybe not that local
- (asymmetric) volume conduction

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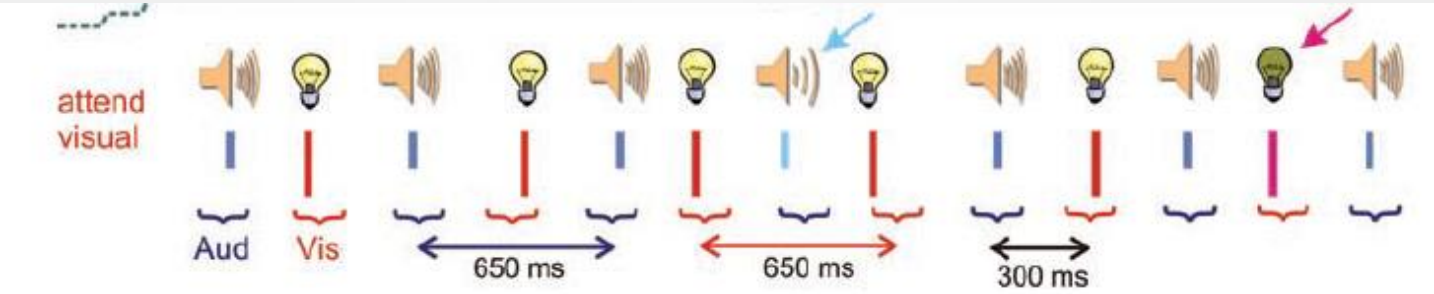
Intermodal selective attention task



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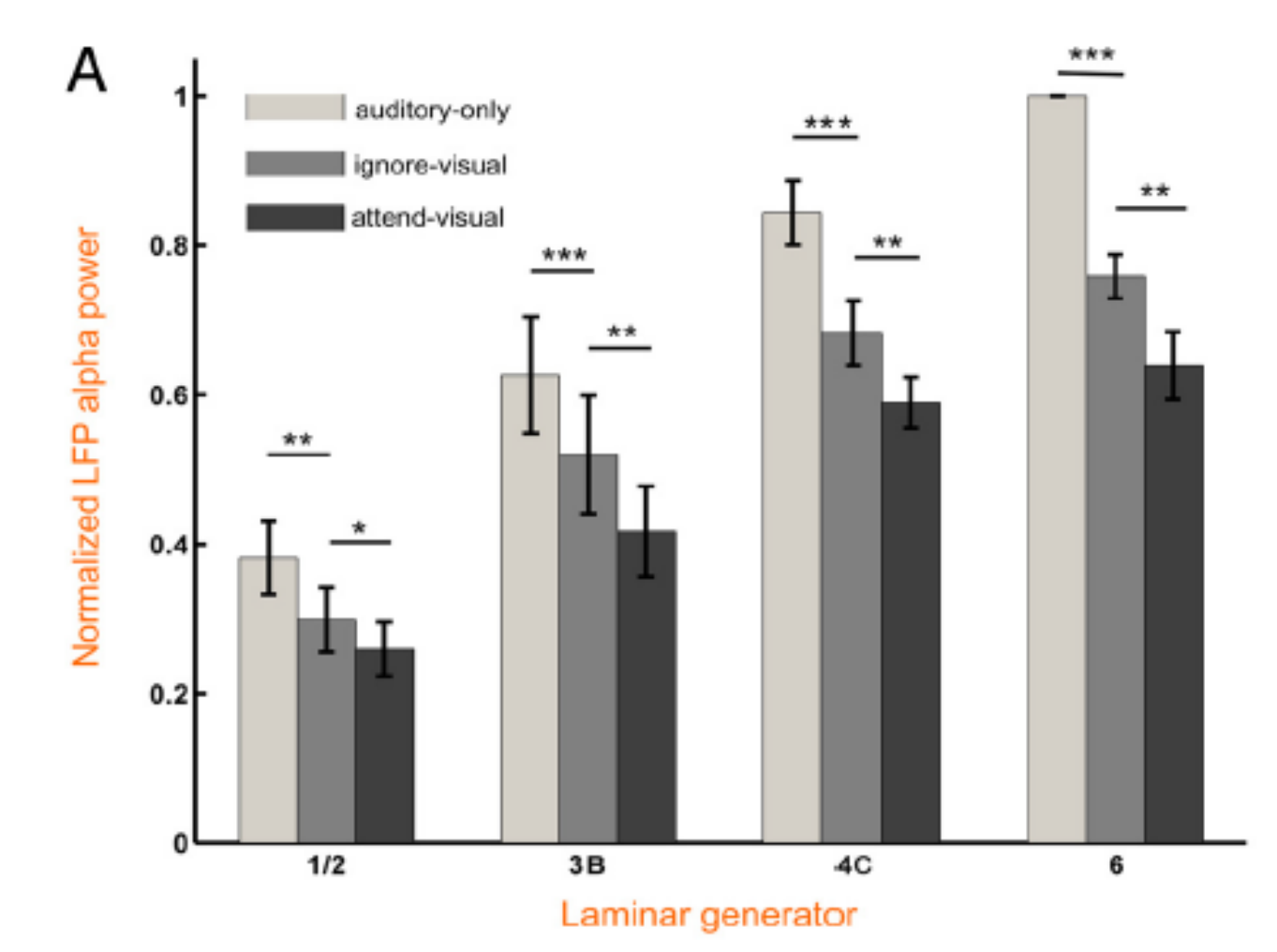
Alpha attention effect in V1



Bollimunta et al (2011) J Neurosci

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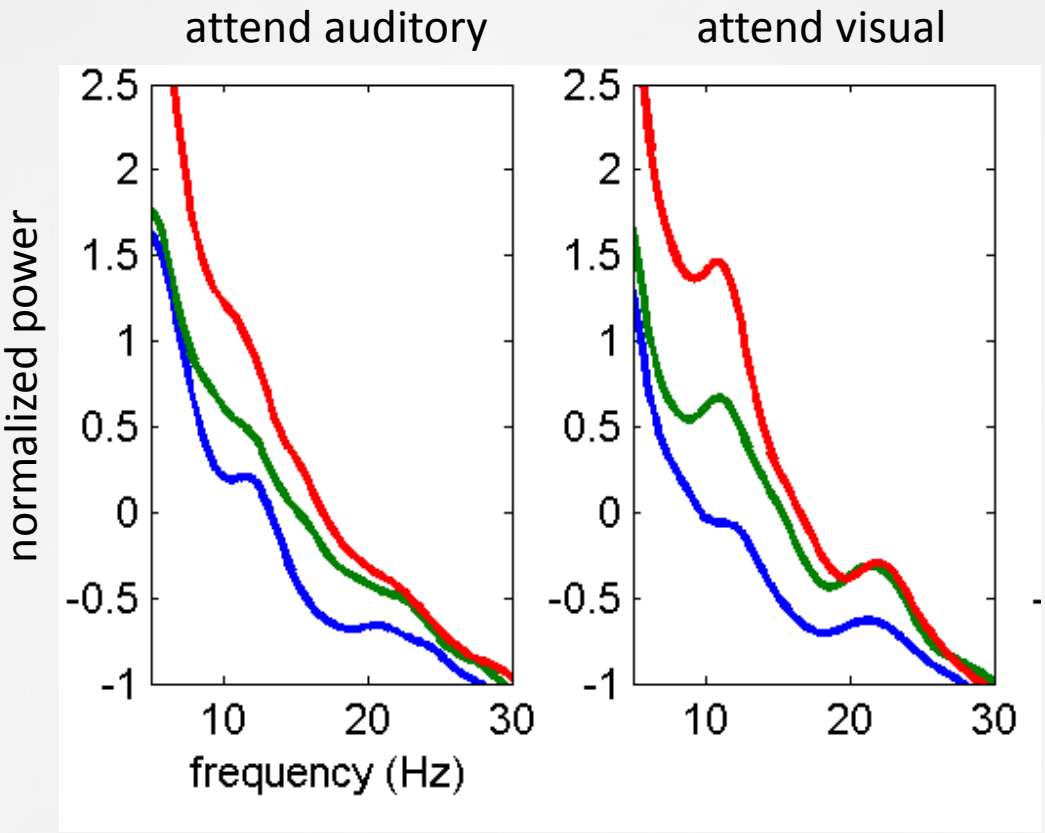
Alpha attention effect in A1



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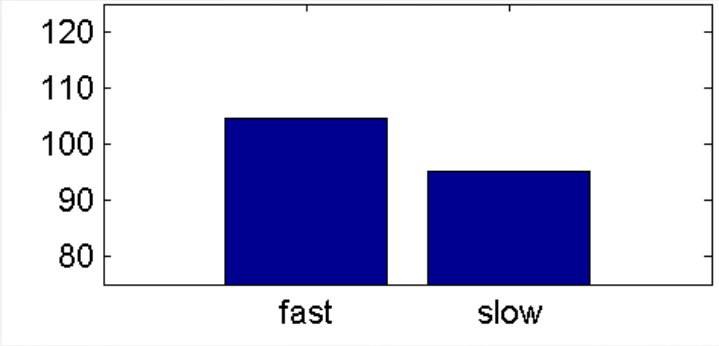
More alpha in irrelevant modality: faster RT

normalized alpha power

V1 – attend auditory



A1 – attend visual

Conclusions

- alpha reflects functional inhibition
- affects behavioural performance
- can be found across sensory modalities
- general mechanism

→ **alpha generators across layers, likely dependent on task context**

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Thank you :)

Columbia/NKI:

- Charlie Schroeder
- Peter Lakatos
- Annie Barczak

Brown University

- Stephanie Jones

NWO
Netherlands Organisation for Scientific Research

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