

ALZHEIMER'S ASSOCIATION INTERNATIONAL CONFERENCE®

JULY 26-30 > ONLINE AND IN PERSON

EEG POWER BIFURCATION IN THE TRANSITION ZONE BETA TO GAMMA –
FROM MOTOR FUNCTION TO COGNITION – IN ALZHEIMER AND LONG
COVID PATIENTS VERSUS HEALTHY CONTROLS REVEALED BY QUANTITATIVE
EEG TIME SERIES ANALYSIS OF LATERAL EEG DATA

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ALZHEIMER PATIENTS - BIFURCATION OF FAI AT 30HZ

PLOS ONE

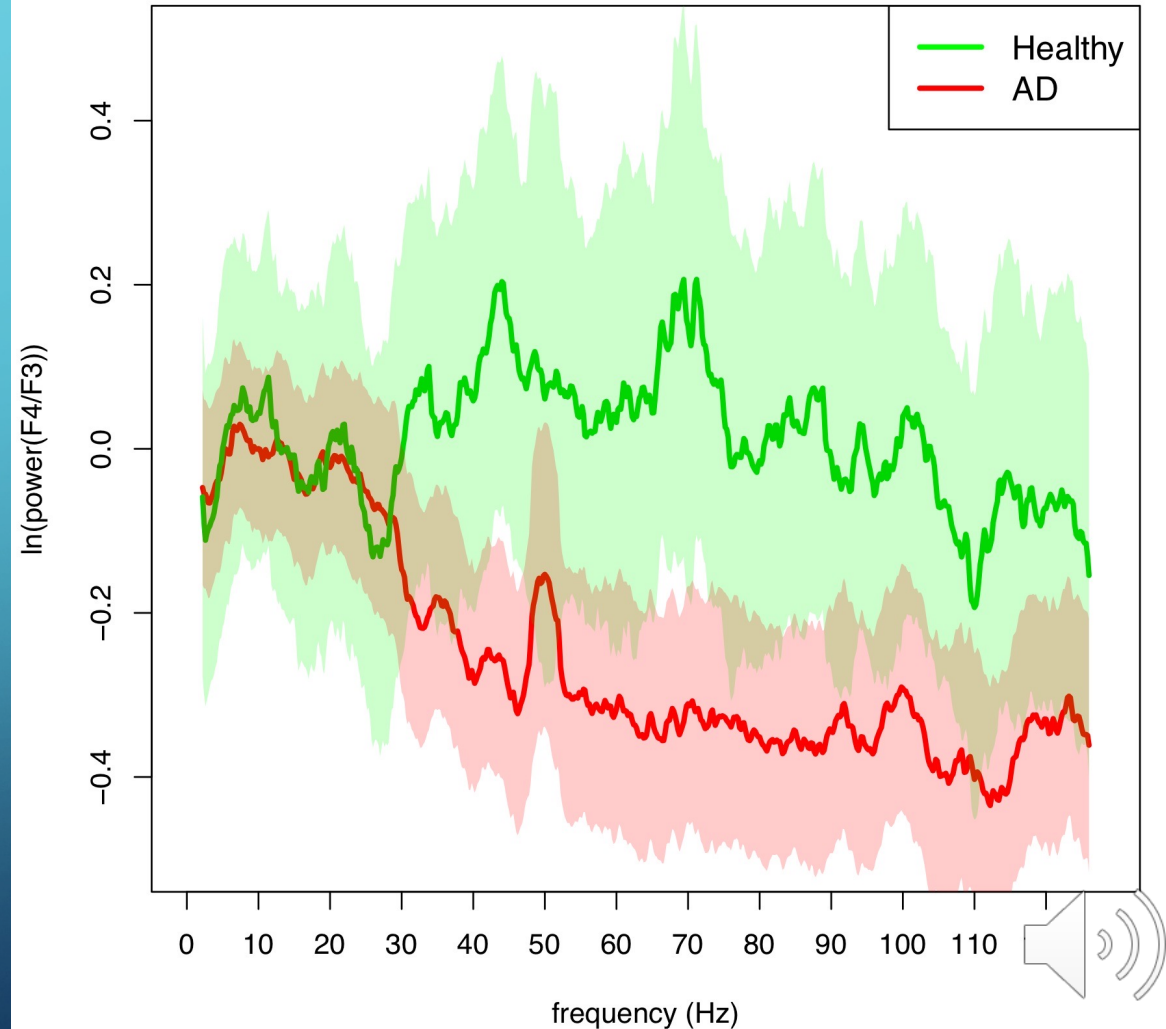
RESEARCH ARTICLE

Accounting for the complex hierarchical topology of EEG phase-based functional connectivity in network binarisation

Keith Smith^{1,2*}, Daniel Abásolo³, Javier Escudero¹

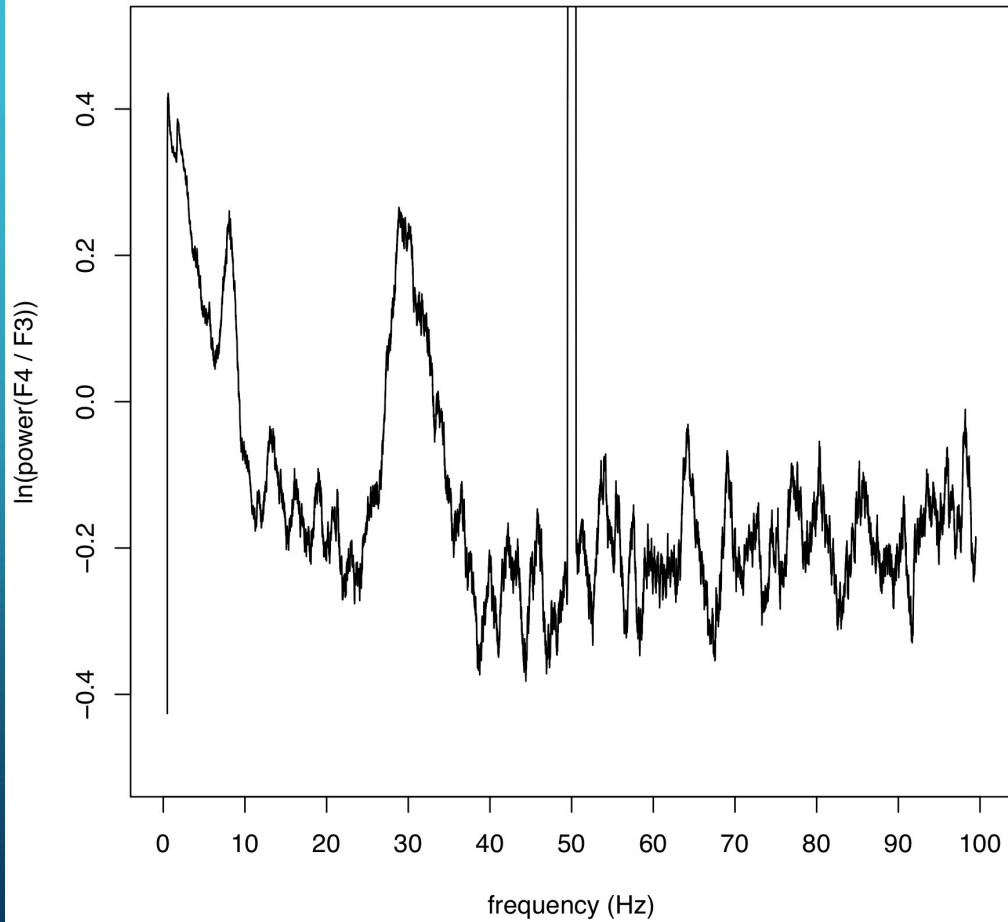
Frontal Asymmetry Index FAI:
 $FAI = \ln(\text{power}(F4/F3))$

Asymmetry F4 / F3

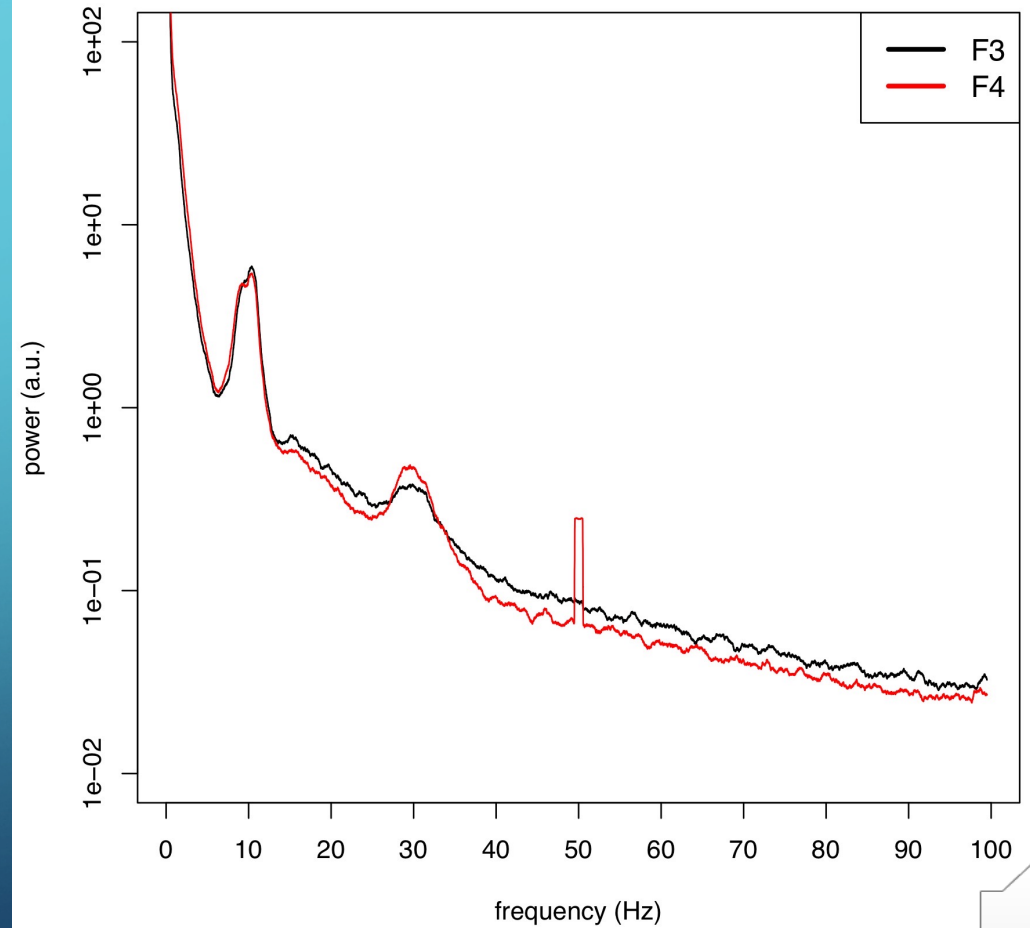


LONG COVID (LC) PATIENT – EEG BETA BAND ANOMALIES

Asymmetry F4 / F3 of LC patient



Power spectra of LC patient



LITERATURE ON EEG BETA BAND ANOMALIES – PARKINSON'S DISEASE

Effects of low-frequency stimulation of the subthalamic nucleus on movement in Parkinson's disease

Alexandre Eusebio^{a,1}, Chiung Chu Chen^{a,b,1}, Chin Song Lu^b, Shih Tseng Lee^c, Chon Haw Tsai^d, Patricia Limousin^{a,c}, Marwan Hariz^{a,c}, Peter Brown^{a,*}

Boosting Cortical Activity at Beta-Band Frequencies Slows Movement in Humans

Alek Pogosyan,¹ Louise Doyle Gaynor,¹ Alexandre Eusebio,¹ and Peter Brown^{1,*}

Neuronal Network Oscillations in Neurodegenerative Diseases

Volker Nimmrich^{1,2} · Andreas Draguhn³ · Nikolai Axmacher^{4,5}

Beta burst dynamics in Parkinson's disease OFF and ON dopaminergic medication

Gerd Tinkhauser,^{1,2,3} Alek Pogosyan,^{1,2} Huiling Tan,^{1,2} Damian M. Herz,^{1,2} Andrea A. Kühn⁴ and Peter Brown^{1,2}

Video abstract to article from Tinkhauser et al on Beta burst dynamics in PD in

<https://academic.oup.com/brain/article/140/11/2968/4430808?login=true>

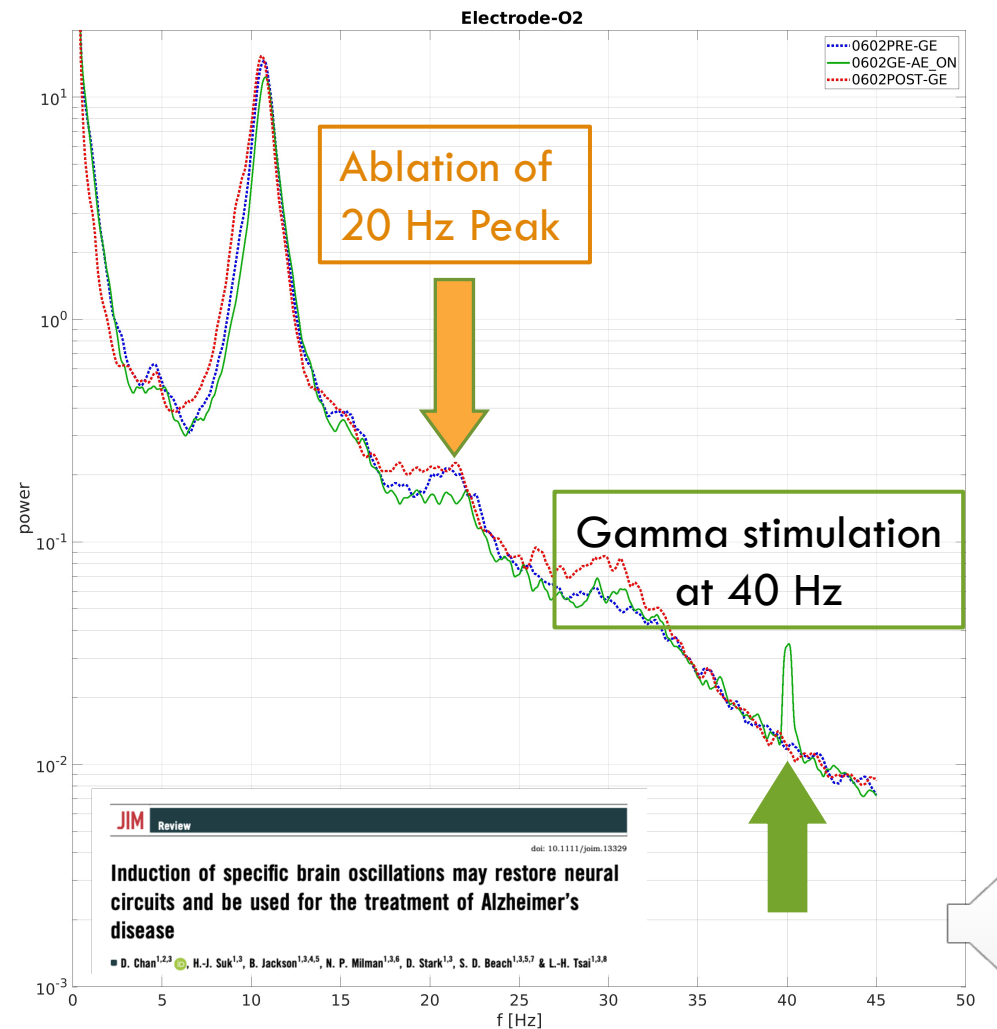
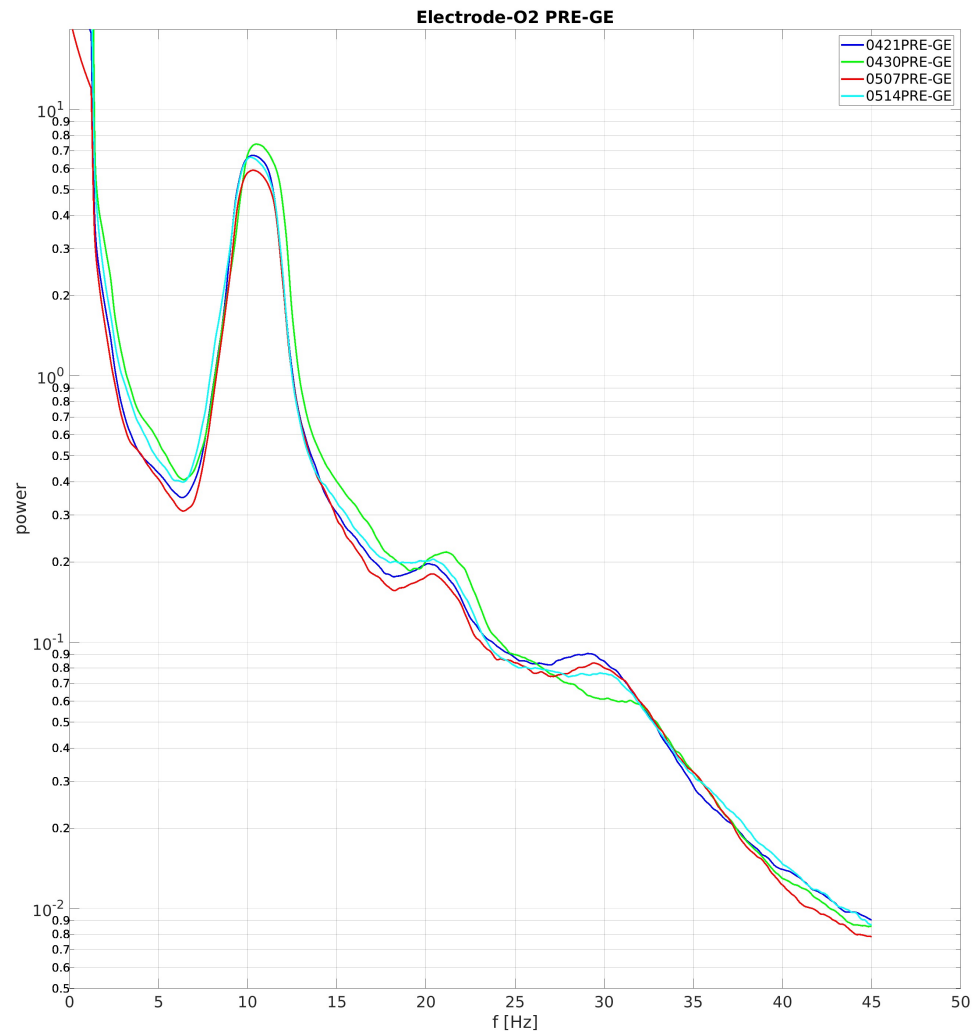
Increased Gamma Oscillatory Activity in the Subthalamic Nucleus During Tremor in Parkinson's Disease Patients

M. Weinberger,¹ W. D. Hutchison,^{1,2} A. M. Lozano,^{2,3} M. Hodaie,^{2,3} and J. O. Dostrovsky^{1,2}

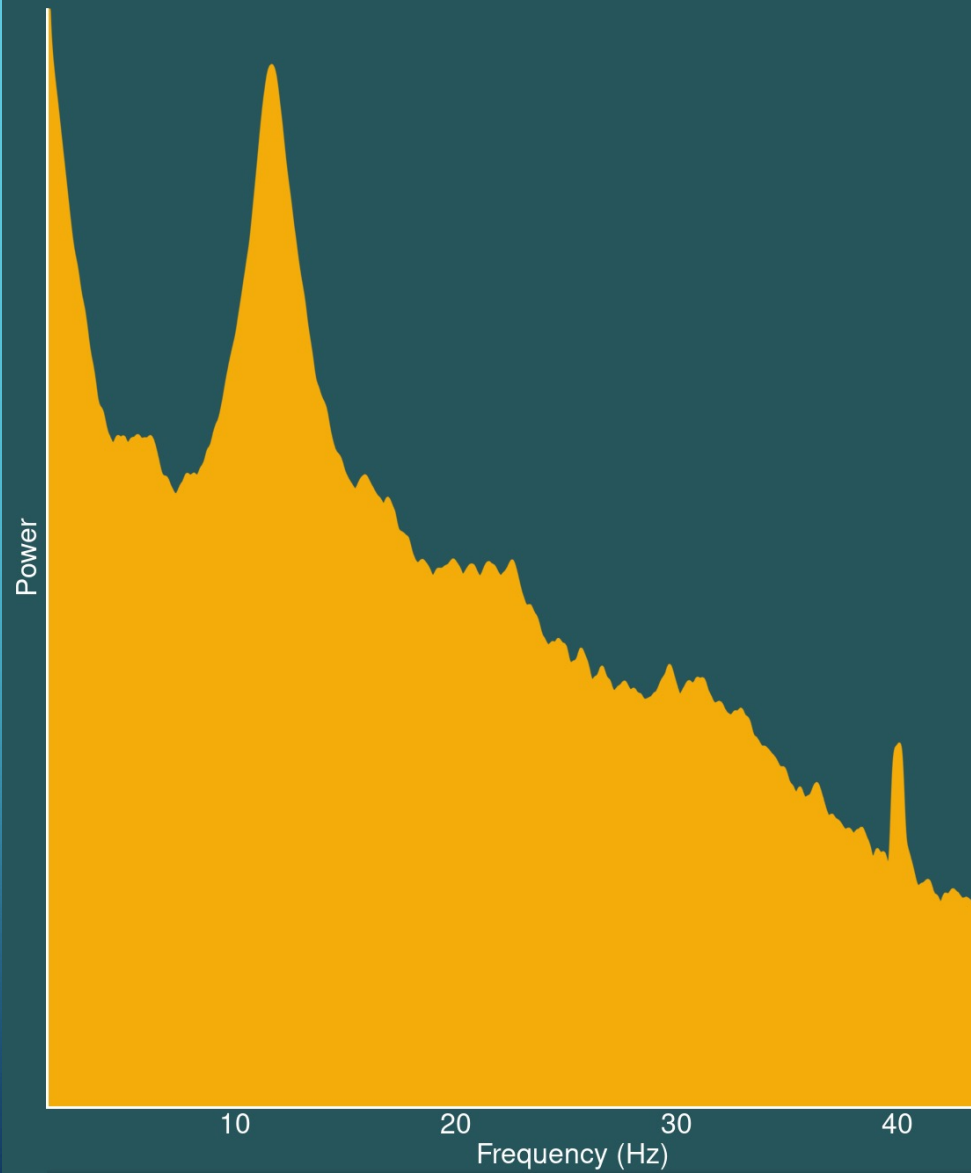
The Cumulative Effect of Transient Synchrony States on Motor Performance in Parkinson's Disease

Gerd Tinkhauser,^{1,2,3} Flavie Torrecillos,^{1,2} Alek Pogosyan,^{1,2} Abteen Mostofi,⁴ Manuel Bange,⁵ Petra Fischer,^{1,2} Huiling Tan,^{1,2} Harutomo Hasegawa,⁶ Martin Glaser,⁷ Muthuraman Muthuraman,⁵ Sergiu Groppa,⁵ Keyoumars Ashkan,⁶ Erlick A. Pereira,⁴ and Peter Brown^{1,2}

HYPOTHESIS: SHIFT OF SPECTRAL ENERGY FROM 20HZ TO GAMMA



ANIMATION OF SPECTRAL ENERGY SHIFT FROM BETA TO GAMMA



TAKE-HOME MESSAGE AND CONCLUSION

Take home message: *The EEG power can be shifted between different frequency bands by gamma entrainment resulting in significant improvements of personal health!*

Main question: *Is there an entrainment scheme with long-lasting effect?*

Concluding Hypothesis:

Sensory neurostimulation can be applied to Alzheimer's patients and possibly reverse their observed gamma power shift into a more healthy direction by using appropriate individual gamma entrainment frequencies.



THANK YOU!

CREDENTIALS

Collaborators:

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Cooperation:

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