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Gamma-band responses in early visual cortices to natural images: broadband gamma is not really broadband

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Narrowband gamma oscillations in the primary visual cortex (V1) have been shown to depend on spatial features and colour in visual stimuli of gratings and uniformly coloured patches [1,2]. In invasive studies, natural images and movies have also been shown to induce these oscillations [1,3]. In non-invasive studies, in contrast, the responses to natural stimuli have been reported to be broadband instead of narrowband [2,4]. Due to its high spatial resolution, OPM-MEG is well-suited for the non-invasive study of weak and focal gamma-band activity [2]. We presented 20 healthy human subjects static images of gratings, uniform colours and natural scenes. We measured their responses inside a three-layer MSR with our OPM-MEG system that includes 15 scalp-normal single-axis OPMs (Gen-1/2 QZFM; QuSpin Inc.). We observed gamma-band oscillations in V1 in all subjects, where the power, frequency, temporal dynamics and burst rate of the oscillations were stimulus dependent. Importantly, we found that the broadband gamma response in averaged MEG data consists of narrowband bursts with peak frequencies spanning over the gamma band. These oscillations could be associated with different image features, while potentially being crucial for non-invasive study of gamma-band responses to natural stimuli.

References

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Author: GRÖN, Mikael (Aalto University)

Co-authors: FORSMAN, Anni (Aalto University); HIETALA, Paavo (Aalto University); POWER, Lindsey (Aalto University); PFEIFFER, Christoph (Karolinska Institute); ZETTER, Rasmus (Aalto University); IIVANAINEN, Joonas (Aalto University); PARKKONEN, Lauri (Aalto University)

Presenter: GRÖN, Mikael (Aalto University)

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