How well can I communicate with you if my keyboard gets locked?
The role of neurons participating in an alpha rhythm is hotly debated. While some studies assert that alpha rhythmic activity serves to process information relevant to the task at hand, other studies claim that it serves to filter out irrelevant information.

Using examples of rhythmic cells and networks of interacting neurons we have seen in class so far, choose a side of the debate and suggest a potential mechanism for generating alpha activity.
Alpha networks

Thalamocortical neurons project from the thalamus to the cortex, and can greatly influence cortical oscillations.
Alpha networks

Thalamocortical neurons as potential generators of the alpha oscillation:

Hughes et al., Neuron, 2004

apply metabotropic glutamate receptor agonists
Alpha networks

Thalamocortical neurons as potential generators of the alpha oscillation:

Lorincz et al., J. Neurosci., 2008

apply muscarinic acetylcholine receptor agonists
Alpha networks

Thalamocortical neurons as potential generators of the alpha oscillation:

The phase of spiking varies with the degree of depolarization, with potential to be quite dynamic.

Multiple spikes in a burst, with bursts occurring at an alpha frequency.
Alpha networks

A single thalamocortical neuron can produce an alpha oscillation in the local field potential:

Lorincz et al., J. Neurosci., 2008
Functional consequences of the alpha rhythm

Interneurons in the thalamus can also exhibit alpha rhythmic bursts.

These interneurons directly inhibit the thalamocortical neurons, creating phasic inhibition.

Lorincz et al., Neuron, 2009
Functional consequences of the alpha rhythm

This would result in very few active neurons

Klimesch et al., Trends Cog. Sci., 2012
Links to behavior and cognitive processes

Increases in alpha are often observed for actively unattended or ignored stimuli:

Worden et al., *J. Neurosci.*, 2000

Y-axis: amplitude of alpha oscillations

X-axis: time from the onset of the cue
Links to behavior and cognitive processes

Hypersynchronous alpha activity is observed during propofol-induced loss of consciousness:

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Using examples of rhythmic cells and networks of interacting neurons we have seen in class so far, choose a side of the debate and suggest a potential mechanism for generating alpha activity.
“Sit in reverie, and watch the changing color of the waves that break upon the idle seashore of the mind.”
-Henry Wadsworth Longfellow