

# BRAINWAVE FREQUENCIES DURING WAKING, REM, AND NON-REM SLEEP

Slower ←

→ Faster

**Delta Waves** 0.5-3 Hz

**Theta Waves** 4-8 Hz

**Alpha Waves** 9-12 Hz

**Beta Waves** 13-30 Hz

## Stage 3 & 4 NREM Sleep

- Minimal arousal level
- Slow, regular, high-voltage waves
- Sleeper is difficult to awaken
- "Synchronized" brain activity
- Occurs primarily in first half of night

## Wake

- Full arousal
- Fast, irregular, low voltage brainwaves.
  - Faster beta waves in *active* waking
  - Slower alpha waves in *quiet* waking (eyes closed).

## Stage 1 NREM Sleep

- Transition stage between wake and sleep
  - Reduced arousal
- Alternation between alpha and theta waves

## REM Sleep

- Fast, irregular brainwaves as in waking
- Brain is highly activated
- Rapid Eye Movement
- Postural atonia
  - Dreaming
- Occurs primarily in second half of night

## Stage 2 NREM Sleep

- "True" sleep
- Alpha disappears
- Theta waves predominate
- "Spindles" drive increasing brainwave synchronization.