NEW HORIZONS OF SLEEP RESEARCH FOR OUR PLANET

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ABSTRACTS
Lapses can be broadly divided into four main types:

1. **Lapses of responsiveness ('lapses')** are complete transient disruptions in the state of awareness, with clear behavioral indications of drowsiness.

2. **Lapses of sustained attention** – Not directly related to level of arousal and can occur when alert, fatigued, or drowsy.

3. **Lapses of task-oriented attention** – Diverted attention.

Our primary focus is on microsleeps, with contributions covering aspects of behavioural detection and characterization, EEG-based characterization and detection, and determination of the underlying mechanisms in the brain via simultaneous recordings of whole-brain BOLD fMRI, 64-ch. EEG, eye video, and EOG, while performing a continuous 2-D visuomotor tracking task. In addition to improving our understanding of what happens in the brain during microsleeps, it is hoped that improved knowledge of the spatiotemporal dynamics of microsleeps will allow us to substantially improve the early detection, and even prediction, of microsleeps and to use this as the basis for a non-invasive early-warning systems with the potential to save many lives.

My talk will (i) provide an introduction to lapses, (ii) overview their importance in the real world, (iii) overview what several research studies have revealed about microsleeps, and (iv) summarize some of the remaining challenges in this fascinating and important area.

### ES-4-2

**CAPACITY LIMITS OF INFORMATION PROCESSING WHEN SLEEP DEPRIVED**

MWL CHEE

Our capacity to process information declines when sleep deprived. Perceptual processing capacity refers to our residual capacity to process peripheral distractors after processing a central task. Visual short term memory capacity refers to the number of visual items we can perceive and remember over a few seconds.

Perceptual processing capacity limitations may not be evident at lower perceptual load but can be uncovered at higher load using functional magnetic resonance adaptation. Indeed our ability to allocate attention to a specific visual category may be compromised during sleep deprivation but the extent to which this occurs relates to the temporal predictability of target appearance. Imaging visual cortex provides a means of uncovering loss of attentional selectivity, which in turn is a contributor to impaired cognition in the setting of sleep deprivation.

Visual short term memory is indeed affected by sleep deprivation but for reasons not obvious from observing behavior. We found deficits in engagement of fronto-parietal activation usually engaged in task performance that suggests a memoranda independent effect on neural activity.

### ES-4-3

**A MOBILE EEG DEVICE FOR ON-LINE ASSESSMENT OF SLEEP QUALITY**

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The polysomnography (PSG) which senses multiple physiological signals including EEG, ECG, EMG and EOG signals is a traditional and common device used to diagnose the participants sleep problems in clinic. People who have the sleep problem will pre-register to do the