256th WPI-IIIS Seminar
~Mini Symposium~

How do cells decide?
~Cellular mechanisms behind local (Uni-hemispheric) sleep~

When we go to bed, our brain generates slow waves that can be easily detected by EEG devices. These sleep slow waves have been shown to reflect sleep pressure and sleep depth: the sleepier you are, the more slow waves you will generate during sleep. Interestingly, it seems that tiredness (sleepiness) can be local, meaning that brain regions engaged in demanding tasks during wakefulness show higher levels of slow-wave activity during subsequent sleep. Yet, it is unknown exactly how this happens. In my talk, I will focus on the cellular mechanisms and circuitry controlling this local sleepiness.

Dr. Waleed ElGrawani

Imperial College London

Date: **Tuesday, August 4, 2026**
Time: **15:00 – 15:45**
Venue: **1F Auditorium, IIIS Building**

＊On-site participation only

IIIS
INTERNATIONAL INSTITUTE FOR INTEGRATIVE SLEEP MEDICINE

筑波大学 高等研究院 Tsukuba Institute for Advanced Research

wpi

MOONSHOT RESEARCH & DEVELOPMENT PROGRAM

Contact: International Institute for Integrative Sleep Medicine, University of Tsukuba
029-853-5859 (ext.5859) | wpi-iiis-alliance@ml.cc.tsukuba.ac.jp

257th WPI-IIIS Seminar
~Mini Symposium~

Mitochondrial and neuronal dynamics controlling the pressure to sleep

The inescapable need to sleep is universal, yet mysterious. To unveil its workings, we studied fly sleep-control neurons. These cells track the mounting pressure to sleep via the flow of electrons through their mitochondria. Lack of sleep shifts these cells' gene expression, alters their mitochondria, and changes their excitability.

The key signal is mitochondrial energy metabolism: when ATP supply and electron flow become mismatched, the neurons respond by promoting sleep.

These same neurons also generate slow brain oscillations whose strength reflects accumulated sleep need.

This neuroenergetic feedback connects cellular energy state to the brain circuits that decide when to sleep.

Dr. Raffaele Sarnataro

The Francis Crick Institute

Date: **Tuesday, August 4, 2026**

Time: **15:45 – 16:30**

Venue: **1F Auditorium, IIIS Building**

＊On-site participation only

INTERNATIONAL INSTITUTE FOR INTEGRATIVE SLEEP MEDICINE

Contact: International Institute for Integrative Sleep Medicine, University of Tsukuba
029-853-5859 (ext.5859) | wpi-iiis-alliance@ml.cc.tsukuba.ac.jp

258th WPI-IIIS Seminar
~Mini Symposium~

Sleep processing of aversive experiences in the hippocampus

Aversive experiences generate memories that link emotional significance to the context in which they occurred. Their stabilization occurs in part during sleep, mediated by coordinated neural activity across brain regions. The hippocampus shows a functional differentiation along its dorsal–ventral axis, with the dorsal hippocampus encoding contextual information and the ventral hippocampus involved in emotional processing. How these regions interact during sleep to support emotional memory processing remains poorly understood. Using electrophysiological recordings in rats, we examined neural activity following rewarding and aversive experiences. We found that aversive experiences are preferentially reactivated during sleep through coordinated dorsal–ventral hippocampal activity.

Dr. Juan Facundo Morici

Institut de Biologie Paris-Seine

Date: **Tuesday, August 4, 2026**
Time: **16:30 – 17:15**
Venue: **1F Auditorium, IIIS Building**

＊On-site participation only

INTERNATIONAL INSTITUTE FOR INTEGRATIVE SLEEP MEDICINE

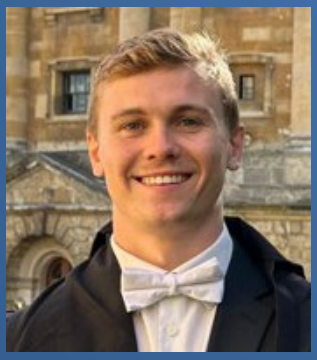
Contact: International Institute for Integrative Sleep Medicine, University of Tsukuba
029-853-5859 (ext.5859) | wpi-iiis-alliance@ml.cc.tsukuba.ac.jp

259th WPI-IIIS Seminar

~Mini Symposium~ Student Seminar

Broad strokes or fine brushes? Shaping sleep globally versus locally

Cortical neuronal activity has long been known to reflect sleep states. More recently, it has also been shown to actively regulate sleep. Yet cortical activity operates across many different spatial scales, raising the question: How is sleep influenced by variations in 'global' cortical activity (associated with sleep states) versus 'local' cortical activity (associated with sleep pressure)? In this talk, I will introduce the cortex's emerging role in sleep regulation and show unpublished data suggesting that global cortical inhibition may induce an unphysiological form of sleep, whereas local cortical modulation can more finely alter sleep while leaving its naturalistic features intact.



Mr. Jack Hamilton

University of Oxford

Date: **Tuesday, August 4, 2026**
Time: **17:30 – 18:00**
Venue: **1F Auditorium, IIIS Building**

＊On-site participation only

IIIS
INTERNATIONAL INSTITUTE FOR INTEGRATIVE SLEEP MEDICINE

筑波大学 高等研究院 Tsukuba Institute for Advanced Research

wpi

MOONSHOT RESEARCH & DEVELOPMENT PROGRAM

Contact: International Institute for Integrative Sleep Medicine, University of Tsukuba
029-853-5859 (ext.5859) | wpi-iiis-alliance@ml.cc.tsukuba.ac.jp

260th WPI-IIIS Seminar

~Mini Symposium~ Student Seminar

When the brain goes cold

During winter, Djungarian hamsters enter daily torpor, a profound and reversible metabolic shutdown during which body temperature drops substantially and brain activity falls almost silent. Yet these animals wake, move, and remember. How does the brain protect and restore itself through such extreme physiological challenge, and what role does sleep play in recovery? Combining electron microscopy, protein biochemistry, cortical electrophysiology, and behaviour, I trace how torpor reshapes synaptic structure, molecular machinery, and network dynamics. The findings suggest that the brain actively remodels during torpor to preserve function across the torpor-euthermia cycle.

Ms. Xiao Zhou

University of Oxford

Date: **Tuesday, August 4, 2026**

Time: **18:00 – 18:30**

Venue: **1F Auditorium, IIIS Building**

＊On-site participation only

IIIS
INTERNATIONAL INSTITUTE FOR INTEGRATIVE SLEEP MEDICINE

筑波大学 高等研究院 Tsukuba Institute for Advanced Research

wpi

MOONSHOT RESEARCH & DEVELOPMENT PROGRAM

Contact: International Institute for Integrative Sleep Medicine, University of Tsukuba
029-853-5859 (ext.5859) | wpi-iiis-alliance@ml.cc.tsukuba.ac.jp