FWF Der Wissenschaftsfonds.

Imaging the Mind Doctoral Program

UNIVERSITÄT SALZBURG

DK "Imaging the Mind" Winter School

Sleep, Cognition and Consciousness

25th – 27th February, 2020

This winter school equips PhD students in a series of lectures, discussions, and practical sessions with theoretical and meth odological knowledge on sleep, cognition and consciousness. Specifically, students will gain background knowledge about the neuronal correlates of consciousness and sleep's neuroanatomy as well as its role in metabolism, emotional processing, and underlying circadian rhythmicity.

WINTER SCHOOL LOCATION

Travel Charme Mountain Resort
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www.travelcharme/bergresort

INFORMATION AND CONTACT

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SCHEDULE

Tuesday, 25th February 2020		
12:50-13:00	Opening	**Manuel Schabus & Josef Perner**
13:00-15:00	***Lecture: Neuroanatomy of sleep***	**Lucia Talamini & Ysbrand van der Werf**
15:00-15:15	Coffee break	
15:15-17:15	***Practical session: Neuroanatomy of sleep***	**Lucia Talamini & Ysbrand van der Werf**
17:15-17:30	Coffee break	
17:30-18:30	***Lecture: Sleep and metabolism***	**Manfred Hallschmid**
18:30-19:30	***Panel discussion: Interface of diabetes, sleep, and neurocognition research***	
19:30	Dinner	

Wednesday, 26th February 2020		
8:45-10:45	***Lecture: Fading of consciousness***	**Tristan Bekinschtein**
10:45-11:00	Coffee break	
11:00-13:00	***Practical Session: Fading of consciousness***	**Tristan Bekinschtein**
13:00-14:00	Lunch	
14:00-16:00	***Lecture: Sleep and Emotion***	**Eti Ben Simon & Eus van Someren**
16:00-16:15	Coffee break	
16:15-18:15	***Practical Session: Sleep and Emotion***	**Eti Ben Simon & Eus van Someren**
18:30	Dinner	

Thursday, 27th February 2020		
8:45-10:45	***Lecture: Rhythms of the Body and Mind***	**Christina Schmidt & Christine Blume**
10:45-11:00	Coffee break	
11:00-13:00	***Practical Session: Rhythms of the Body and Mind***	**Christina Schmidt & Christine Blume**
13:00-14:00	Lunch	

Lucia Talamini & Ysbrand van der Werf

University of Amsterdam & Free University of Amsterdam (the Netherlands)

Neuroanatomy of sleep

Drs Talamini and van der Werf will deliver a double lecture that will cover (1) brain structures and neurotransmitters involved in arousal and alertness; (2) the brain mechanisms of sleep onset, sleep maintenance, and sleep state switching; (3) medicated and non-medicated approaches to sleep therapy; (4) functions of sleep (e.g., energy saving, cognitive, emotional, immune, evolutionary perspective); and (5) novel experimental and pre-clinical approaches to bolster the functions of sleep.

Their practical session will (1) demonstrate the location and anatomy of brain structures involved in sleep and wakefulness in the mammalian brain; (2) provide a hands-on interactive session to acquaint the students with neuroanatomy; and (3) point out commonalities and differences between the human and non-human brain.

Manfred Hallschmid

University of Tübingen (Germany)

Sleep and metabolism

In parallel with the increasing prevalence of obesity and type 2 diabetes mellitus (T2DM), sleep loss has become common in modern societies. Epidemiological studies indicate an association of short sleep duration, sleep disturbances, and circadian desynchronization of sleep with adverse metabolic traits, in particular obesity and T2DM. Furthermore, experimental studies point to distinct mechanisms by which insufficient sleep adversely affects metabolic health. Alterations in the activity of neuroendocrine systems appear to be major mediators of the detrimental metabolic effects of insufficient sleep, favoring outcomes such as increases in appetite, improved sensitivity to food stimuli and, ultimately, a surplus in energy intake. Although long-term interventional studies proving a cause-effect relationship are still lacking, sleep loss appears to be an attractive target for the prevention and probably also treatment of metabolic disease.

LEARNING GOAL: In this workshop, we are first going to learn about the regulation of eating behavior and body weight from a neurobiological perspective, addressing the roles of homeostatic, reward-related and cognitive factors as well as input from the body periphery, especially neuroendocrine messengers. In a second step, we will look at how sleep loss disrupts metabolic control and promotes weight gain and consider potential mechanisms as well as the clinical potential of sleep-centered interventions to improve metabolic function.

Tristan Bekinschtein
University of Cambridge (United Kingdom)

Fading of consciousness

Being awake or asleep are two states of the brain, of the mind, of consciousness that can be easily separated conceptually as well as through the evaluation of behavioral measures and neural markers. We will discuss the very large differences that exist between these states within the same person or animal and how these states come to be. How do we transition between these states? What happens to the physiology of the brain between states? Is the change linear, smooth, reversible? What does it mean to characterize the dynamics of cognition and neural signals in order to understand how we lose conscious awareness?

Sleep was thought to be a stable state that we now know to be dynamic. As with sleep, also conscious awareness is prone to change in its mode of processing. We use these fluctuations to understand the brain dynamics of these states and take advantage from meditation, sleep deprivation, and sleep transitions to understand who we are in every state and the spaces in between.

Eti Ben Simon & Eus van Someren
University of California (USA) & Netherlands Institute for Neuroscience (the Netherlands)

Sleep and Emotion

You may be surprised how much of how you feel during the day depends on how you slept last night, and how you slept all of your life. Maybe you recognize being tired and irritable if you had too little sleep. But there is much more. Eti Ben Simon and Eus Van Someren will introduce you to the basic and latest findings on the importance of sleep for remembering and forgetting facts and feelings of emotional experiences. Eti will address how a lack of sleep changes how you feel as well as how you relate to others. Eus will address how poor quality sleep, as experienced by people suffering from insomnia affects overnight resolution of emotional distress. The presentations give a bird's eye view ranging from epidemiology to brain mechanisms. Hands-on practicals may include a student led task demonstration of the link between sleepiness and mood (Eti), experience how emotions can be experimentally induced or assessed for overnight studies (Eti, Eus) and finding out which type of insomniac you may be or once become by filling out a cognitive and emotional trait profile questionnaire (Eus).

Christina Schmidt & Christine Blume
University of Liège (Belgium) & University of Basel (Switzerland)

Rhythms of the Body and Mind: Circadian and Sleep-Wake Dependent Regulation of Physiology and Cognition

The average European life lasts for more than 28000 days and each of these days is precisely 24 hours long. Intriguingly, despite travelling across time zones or seasonal changes in day length our body keeps an astonishingly stable and precise timing of these 24 hours. Moreover, we can flexibly adapt to changes in the environment (e.g. when travelling across time zones). This stability and flexibility of our 'internal clock' is brought about by the so-called circadian (from Latin 'approximately one day') timing system, which is located in the hypothalamus of mammalian brains. In everyday life, the effects of this internal biological clock become most obvious when looking at the (human) sleep-wake cycle. However, beyond this, they influence a plethora of bodily processes ranging from the level of gene expression to higher cognitive functions and underlying cerebral correlates. The impact of the clock on the latter might be particularly observable in populations such as clinical populations or patients with altered cognitive capacities.

LEARNING GOAL: In this workshop, we are going to learn about the circadian timing system from a (neuro-)biological perspective. Precisely, we will learn how the brain, light, hormones, and behaviors interact to bring about circadian rhythms. Building upon this, we will then have a closer look at circadian variations in cognitive processes and why they are relevant for (neuro-)scientific experiments. In a case study, we will finally integrate the knowledge gained and apply it to diagnosing a circadian rhythm disorder. Following this, we will also suggest treatment options.