

# UZH Center of Competence *Sleep & Health Zurich*

## Activity Report 2017-2020

The UZH Center of Competence *Sleep & Health Zurich* (SHZ) was launched in 2014 as “Zürcher Zentrum für interdisziplinäre Schlafforschung” (ZIS), constituting an interdisciplinary network of investigators in sleep and chronobiology research and medicine. The subsequent report summarizes the achievements and accomplishments by the SHZ during the second accreditation period (2017-2020).

### 1. Objectives and achievements for the reporting period

#### 1.1 Achievements (overview)

The reporting period was dedicated to the consolidation of the strategic goals achieved during the initial phase of existence (2014-2016). Most objectives specified both in the development plan submitted in 2017 and the recommendations of the Dean’s Office of the Faculty of Medicine (April 25, 2017) could be successfully met. These achievements are briefly summarized in the following paragraphs.

#### **Structure, organization and networking**

We streamlined the SHZ organization. All activities are coordinated by the Executive Office (scientific coordinator: until June 2017, Manuela Steinauer; since July 2017, Dr. Caroline Kopp), which was financed until the end of 2019 by the CRPP *Sleep & Health* and the HMZ Flagship project *SleepLoop*. Starting in 2020, the executive office is financed directly from SHZ funds. We also further developed networking among all sleep basic researchers and clinical scientists in Zurich, including the junior groups. We reinforced networking activities with the Neuroscience Center Zurich (ZNZ) through announcements of seminars, scientific events and the integration of sleep and chronobiology related lectures in the ZNZ PhD program (see § 4 for details), and actively reached out to researchers at ETH Zurich (see § 2 for details).

#### **Research and visibility**

We promoted integrative, multidisciplinary and translational research projects and established complementary research methods in the field (see § 2 for details). We strengthened the national and international relevance of the SHZ through the preparation of a NCCR application, as well as the organization of national and international symposia (see § 3 for details). We raised third-party funds by securing sponsorship for the annual SHZ and sleep medicine symposia and establishing in 2020 a strategic partnership with the Swiss Brain Foundation.

## Education

We coordinate and further developed education and continuing-medical-education (CME) programs, as well as training opportunities (see § 4 for details).

## Outreach

We promote an effective public outreach (see § 5 for details). Links to the presence of the SHZ in the media and public events can be found on our website: [Link to SHZ outreach](#). Other primary research dissemination activities of the SHZ include communication through social media (Twitter [@UZH\\_SHZ](#)) and the website [www.sleep.uzh.ch](http://www.sleep.uzh.ch) that was totally restructured in 2019-20, as well as the organization of public events.

## 1.2 Objectives not yet achieved

### Long-term solution for the human sleep station (where and in which form)

The SHZ successfully fosters collaborations among human sleep researchers and clinicians who currently are distributed and run separate sleep laboratories across Zurich. The human sleep research infrastructure consists of scattered lab space, including a high-end human sleep research laboratory on Campus Irchel (Institute of Pharmacology and Toxicology), which is partly used as a core facility for SHZ members. Nevertheless, a direct integration of this dedicated and state-of-the-art facility with clinical sleep research and services would be desirable. To foster even stronger ties among the Zurich sleep community and enable a true translational research pipeline starting from basic sleep research and extending into the hospital, the chairs of the SHZ proposed in 2017 the implementation of an interdisciplinary human sleep research center at one of the UZH University hospitals. Since then, several meetings among the Deans of the Medical Faculty, the Executive Board of the University Hospital Zurich and the UZH Board of Directors have not yet led to a common vision of a long-term solution. The co-location of the basic human sleep scientists with clinical sleep investigators would lead to important synergies and major scientific opportunities and help secure the international competitive edge that the SHZ currently enjoys.

## 2. Structure and Organization

The SHZ is organized as specified in the **bylaws**. We modified the initial version of the bylaws (2014) according to the decisions of and the approval by the general assembly in 2017. The amended version of the bylaws was approved by the Executive Board of the University of Zurich in 2018 and can be found on our website: [Link to the bylaws](#). The main objective of the amendment was to rename the Center of Competence from “Zürcher Zentrum für interdisziplinäre Schlafforschung” (ZiS) to *Sleep & Health Zurich*, to (1) safeguard the label *Sleep & Health Zurich* as a brand for excellence in the field of sleep research, sleep medicine and chronobiology in Zurich when the CRPP *Sleep & Health* will have run out; and to (2) improve the visibility of the center at national and international levels. In addition, the new

bylaws further specify the roles and duties of the members and allow remote decision making by the General Assembly.

The organs of the SHZ are the General Assembly, the Steering Committee, the Scientific Advisory Board and the Executive Office (coordination).

The **General Assembly** is constituted by the full members of the SHZ. As specified in the bylaws, the General Assembly met once per year for the business meeting: 20.04.2017, 01.02.2018, 19.04.2019, 27.11.2020. Among its duties, the General Assembly approved the admission of new members:

2017: 9 new members (1 full, 2 associate, 6 junior)

2018: 13 new members (5 full, 4 associate, 4 junior)

2019: 7 new members (4 full, 1 associate, 2 junior)

2020: 5 new members (3 full, 2 junior)

Among the new members, the SHZ welcomed 4 new associate members from ETH Zurich, as well as 6 new junior group leaders. At the end of 2020, the SHZ pooled forces of 25 independent research groups (23 at UZH, 2 at ETH [one has a double affiliation at both institutions]) and counted a total of 47 members (28 full, 6 associate, and 13 junior members). To promote and facilitate the formation of new collaborative networks, all full and associate members are briefly portrayed on our website, together with their profile including research interests, expertise, collaborative projects and publication lists: [Link to the members](#). The junior members are listed under the respective group leaders. The actual list of SHZ members in December 2020 is attached as **Annex 2**.

The recurring interest of ETH group leader for SHZ membership and the synergies in sleep research developed within the past four-five years with ETH Zurich (see § 3) highlights the strong interest of many research groups at ETH for the field. This interest reinforced the current project of developing the SHZ towards a joint UZH-ETH Center of Competence. A Task Force (see **Annex 3**) was formed in the Summer 2020 to work on this project. The task force already met four times and a retreat is planned in Spring 2021.

The **Steering Committee** is composed by Prof. Hans-Peter Landolt (Chair; Institute of Pharmacology and Toxicology, UZH, since 2014), Dr. Esther Werth (Department of Neurology, USZ, since 2017) and Prof. Salomé Kurth (Department of Pulmonology, USZ, since 2018). With this composition, basic sleep and chronobiology research, as well as two main fields of sleep medicine are represented in the Steering Committee.

The **Scientific Advisory Board** is composed by Prof. em. Alexander Borbély (main expertise: human basic sleep research), Prof. Christian Cajochen (chronobiology), Prof. Matthias Guggen (sleep medicine), and Prof. Mehdi Tafti (animal basic sleep research).

The **Executive Office** position was held <10% in 2019. To meet the requirements of the digital restructuring of the SHZ, it is currently occupied at 40% (since June 2020). Previously, the coordination

was ensured by the coordinator of the CRPP *Sleep & Health* (2014-2017), subsequently by the coordinator of the HMZ Flagship project *SleepLoop* (2018).

### 3. Research Initiatives

Since its foundation in 2011, *Sleep & Health Zurich* has reinforced and steadily enlarged the interdisciplinary network among basic researchers and clinical scientists in the field of sleep and chronobiology research and sleep medicine in Zurich. The mutual exchange and networking gave way to major research programs, including the CRPP *Sleep & Health* and the HMZ Flagship projects *SleepLoop* and *Zurich Exhalomics*. The two HMZ Flagship projects are joint initiatives with researchers of ETH Zurich. Brief summaries of the major achievements of these projects during the reporting period will follow below.

The scientific output of the SHZ networking over the reporting period is highlighted in 211 publications on the topics sleep or chronobiology. The scientific content of these publications was extensively communicated and discussed in the framework of the *Sleep & Health* seminar series and during the *Sleep & Health* symposia organized every year.

Year	Number of publications	Pubmed list of publications
2017	56	<a href="#">SHZ 2017</a>
2018	40	<a href="#">SHZ 2018</a>
2019	56	<a href="#">SHZ 2019</a>
2020	59	<a href="#">SHZ 2020</a>

Last but not least, a NCCR project initiative “SLEEP” resulted from the intense networking within the SHZ, as well as with sleep and chronobiology researchers at all other Swiss Universities.

#### 3.1 CRPP *Sleep & Health*

During the reporting period, the CRPP *Sleep & Health* comprised 6 successful collaborative projects involving 8 UZH research groups, all SHZ members. This research program strengthened the international visibility of sleep and chronobiology research at UZH and created the basis for collaborative research and education. Cutting-edge science was conducted and published in high-impact journals (e.g., *Neuron*, *Cell Metab*, *eLife*) and actively communicated to fellow researchers and to the public (see § 3.4 and 5). The scientific success of the CRPP *Sleep & Health* accelerated both financial and personal synergies:

- The CRPP research groups were awarded 8.5 mio CHF in 12 SNF project grants, 2 Sinergia consortia and 1 ERC starting grant (Prof. Björn Rasch). A multitude of other competitive and non-competitive third-party funds was also secured (approx. 5 mio CHF).
- Overall, 40 promising young scientists were furthered as doctoral and postdoctoral fellows within the scope of the collaborative CRPP projects. As a highlight, based on a competitive international selection procedure, the creation of a junior group leader position enabled a young female scientist,

Dr. Salomé Kurth, to return to Switzerland from a postdoctoral fellowship in the US. She successfully established her own independent research at UZH and won in 2019 a highly competitive Eccellenza Professorial Fellowship of the SNF. She now continues and extends her research focusing on sleep regulation in the first months of human life at the University of Fribourg, keeping an affiliation with the Department of Pulmonology at the USZ and remaining active in the SHZ Steering Committee.

### **3.2 HMZ Flagship projects *SleepLoop* and *Zurich Exhalomics***

The scientific synergies developed within the SHZ in the framework of the CRPP *Sleep & Health* provided new knowledge about disease mechanisms and set the stage for the transfer of this knowledge into the development of new tools for clinical practice and health promotion. The steady exchange of innovative ideas and concepts with research groups at ETH Zurich enabled the HMZ Flagship projects *Zurich Exhalomics* (since 2016) and *SleepLoop* (since 2017). Both these research projects are of high medical importance and strategic relevance for both Universities:

- *SleepLoop* develops and validates a mobile point-of-care sleep modulation technology for applications in various neurological, mental and systemic diseases at diagnostic, prognostic and therapeutic levels. Out of this project, the **spin-off company Tosoo AG** was founded in 2020. The purpose of Tosoo AG is the development, production and marketing of new technologies for the promotion of health and well-being, in particular for the improvement of sleep, as well as the acquisition, development and management of intellectual property rights in this field.
- *Zurich Exhalomics* develops new biomarkers for respiratory diseases, based on the molecular analysis of the exhalome of patients and healthy individuals and taking into account circadian and sleep-related metabolic changes detected in breath.

### **3.3 Further initiatives: NCCR and URPP applications**

The synergies developed in the framework of the projects mentioned above not only led to fruitful scientific exchange among scientists UZH and ETH Zurich, but also sparked interest on a national level. The SHZ joined forces with sleep and chronobiology researchers across Switzerland to prepare and submit the proposal “SLEEP” to the 2018 call for new National Competence Centers of Research (NCCR). The proposal was very favorably evaluated at Faculty and University levels, as well as by the Swiss National Research Foundation. The preproposal was rated with highest possible mark (“A”) by an international panel of reviewers and the full proposal was listed among the finalists, but finally was not chosen for funding. A full proposal was also invited to the 3<sup>rd</sup> call for University Research Priority Programs (URPP), yet the proposed project “Sleep in Society” was not granted. In all these initiatives, the SHZ group leaders played pivotal and leading roles.

### **3.4 Scientific Events**

The annual Sleep & Health Symposium was part of the 17<sup>th</sup> Zurich Sleep Medicine Symposium on 20 April 2017, and since 2018 organized as a joint event with a separate program dedicated to research in conjunction with the annual Zurich Sleep Medicine Symposium (02.02.2018, 19.04.2019,

27.11.2020). These symposia showcase actual local collaborations and hot topics in sleep and chronobiology research. In 2018, the 2<sup>nd</sup> international symposium *Sleep & Health Zurich* featured a three-day program including two keynote speakers from the US and attracted roughly 250 participants from Switzerland and abroad. The symposium was accredited by the European Sleep Research Society the Swiss Society for Sleep Research, Sleep Medicine and Chronobiology, as well as other relevant Swiss Medical Societies in the field (neurology, pulmonology and general internal medicine). The programs of the *Zurich Sleep & Health* symposia are available online: [Link](#).

Within the framework of the HMZ Flagship project *SleepLoop*, an International Conference on Advanced Sleep Modulation Technologies was organized in October 2019 on Monte Verità (Congressi Stefano Francini). The conference addressed the question of the effects of sleep on health and performance and their biological mechanisms by assembling internationally renowned scientists and representatives from industry across a wide range of disciplines (neurosciences, engineering, computer science, epidemiology, ethics, and economics). Through intensive transdisciplinary exchange on the topics of sleep and technology, the aim was to shape novel concepts for application-oriented and translational research to beneficially impact sleep and society. The scientific exchange at this conference already led to international collaborative projects, such as an ongoing study together with the Netherlands Institute for Neuroscience (Prof. Eus van Someren).

### **3.5 Continuing Medical Education**

The SHZ pursues an active and close collaboration with the Sleep Medicine Center of the Zurich University Hospital. The SHZ Executive Office led the organization of the joint annual symposia, which are accredited each year by the Swiss Society for Sleep Research, Sleep Medicine and Chronobiology, as well as the relevant Swiss medical societies in neurology, pulmonology, psychiatry and general internal medicine (see below).

### **3.6 Promotion of young researchers**

Made possible by financial support of the CRPP *Sleep & Health*, the SHZ created in 2016 the SHZ Junior Grant, to promote interactions and networking among the young sleep researchers.

The 1<sup>st</sup> grant was awarded to the project “Women in Sleep Science” (2016-2018), dedicated to the organization of regular meetings of young female scientists to discuss personal experiences, career-relevant topics, and solutions to overcome related issues such as the compatibility of family and academic career.

The 2<sup>nd</sup> grant was awarded to the project “Monitoring infant sleep by actigraphy - State of the art and future directions” (2017). In the realm of this project, a workshop was conducted, to achieve an overview on the currently available actigraphy devices for research and clinical applications in infants and toddlers, and to discuss data analyses approaches and solutions to resolve existing issues in exchange with other research groups in this field. As part of this grant, a student course (BME 348) was offered in the Biomedicine curriculum at UZH, to introduce the students to actigraphy and to establish an overview of the relevant literature. Based on this literature search, international experts were invited for

a panel discussion at a European Congress. The outcome of these meetings was summarized in an information sheet incorporating state-of-the-art knowledge on monitoring sleep by actigraphy that was made available to students, researchers and clinicians, as well as in a peer-reviewed publication.

The 3<sup>rd</sup> grant was awarded to the project “The New Sleep Research Generation” (2018-2019), an initiative based on “Women in Science” and strengthened the networking of young sleep researchers within and around academia.

Because of the expiration of the CRPP *Sleep & Health*, no funds were available to award a SHZ Junior Grant in 2020.

## 4. Education and Teaching

### 4.1 Sleep & Health Seminar Series

The original “CRPP/ZiS Sleep & Health Seminar” was pursued and renamed to *Sleep & Health Seminar* in 2017 (UZH course SPV0Y040). The overall aim of this seminar series hosted by the Medical Faculty is to foster opportunities for thorough scientific communication, interactions and discussions on the topics sleep and chronobiology among all research groups of the competence center, including basic scientists and clinician scientists, students and principal scientists alike. The program of the past seminar series is available online: [Link](#).

### 4.2 Other lectures and courses on sleep and chronobiology

Various members of the SHZ regularly offer lectures and courses on sleep research, sleep medicine and chronobiology in the Medical and Science Faculties. The contents of these lectures and courses are coordinated among the SHZ members and cover a wide range of complementary basic and clinical topics that are systematically included in the UZH Course Catalogue.

The courses with dedicated sleep and chronobiology contents offered during the reporting period (2017-2020) are listed below:

Abbreviation	Course title	Category	Faculty
TBL 4010	Themenblock Psyche und Verhalten	Lecture series	Medicine
TBL 4040	Themenblock Nervensystem	Lecture series	Medicine
HUB 2050a	Vorlesung Humanbiologie II	Lecture series	Medicine
BME 246	Biomedicine II	Lecture series	Science
BME 302	Systems Neurobiology	Block course	Science
BME 306	Experimental human studies	Block course	Science
BME 348*	Using actigraphy in sleep research	Block course	Science
BIO 320	Sleep and wake regulation	Block course	Science
BIO 333	Comparative physiology and pharmacology of sleep	Lecture series	Science
BIO 362	Topics in Chronobiology and Sleep Research	Lecture with practical exercises	Science
SPVOY020	Introductory Course in Neuroscience II (ZNZ)	Lecture series	Science
NEUOM004	EEG-Felder und Hirnfunktionen	Block Course	Science

\* in FS 2017 only

### 4.3 Continuing Medical Education

During the reporting period, the SHZ Executive Office led the organization of the joint annual symposia with the Sleep Medicine Center of the Zurich University Hospital (see above). The Zurich Sleep Medicine Symposium planned in 2020 needed to be postponed to September 2021 because of the lasting severe Covid-19 Situation. In each year, the symposium was accredited by the Swiss Society for Sleep Research, Sleep Medicine and Chronobiology, as well as the relevant Swiss medical societies in neurology, pulmonology, psychiatry and general internal medicine.

The joint annual *Sleep & Health and Zurich Sleep Medicine Symposium* constitutes a major source of financial income for the SHZ and provide a welcome opportunity to develop contacts with the industry for furthering common projects.

The program of the Zurich Sleep Medicine symposia is available online: [Link](#).

## 5. Outreach

### 5.1 Outreach to society

#### Website, Twitter and media presence

During the reporting period, the SHZ continuously communicated its activities and breaking news in the field of sleep and chronobiology research to the scientific community and the interested public via its revamped website [www.sleep.uzh.ch](http://www.sleep.uzh.ch) and its official Twitter account [@UZH\\_SHZ](https://twitter.com/UZH_SHZ).

The presence of the SHZ in the media is reported on its website: [Link to media presence](#).

#### Major public events organized by or with participation of members of the SHZ:

- BrainFair 2017 *Faszination Gehirn*: short lectures to the topic sleep, lab tours.
- Public event *Schlaf, Gesundheit und Gesellschaft* (February 2, 2018), moderated by Stephan Klapproth.
- Exhibition *100 Ways of Thinking* (25.08.2018 - 04.11.2018): Sleep was featured in this exhibition at the "Kunsthalle Zürich" with active participation of SHZ members.
- Exhibition *Schlaf Gut, Dem Schlaf auf der Spur* (18.11.2018 - 24.03.2019): Sleep was featured in this exhibition at the "Vögele Kultur Zentrum" with active participation of SHZ members.
- BrainFair 2019 *Das gesunde Gehirn*: Discussion forum to the topic sleep and nutrition.

### 5.2 Outreach to industry and politics

#### Zurich Sleep 2018, "Innovation und Innovationstransfer in der Schlafforschung"

An exclusive event (pitches and podium discussion) with eminent local and international sleep scientists (e.g., Hannah Ahlheim, Justus-Liebig-Universität Giessen), representatives of industry (e.g., Jean-Luc Bazin, Swatch Group) and politics (e.g., Claudia Roth, Vice-President of the German Bundestag; Nicole Schaad, State Secretariat for Education, Research and Innovation), and potential donators was organized on December 6, 2018, which also enjoyed the presence of representants of the Zurich



Universities and the University Hospitals (Michael Hengartner, Rector, UZH; Detlef Günther, Vice-President Research, ETH Zurich; Martin Waser, President of “Spitalrat”, USZ).

## **6. Financial Report**

From 2017 through 2019, the main financial source of the SHZ were the CRPP *Sleep & Health* and the HMZ Flagship project *SleepLoop* for covering the costs of SHZ activities and the staff of the Executive Office. The SHZ acquired third-party funds from sponsorship for the symposia and seminar series, as well as from the recently established partnership with the Swiss Brain Foundation.