Supplementary Table 1: Neuronal dynamics of thalamic and cortical neurones across spontaneous sleep-wake states, optogenetic perturbation and recovery sleep.

	No. Cells	No. Animals	Spike Rate (spikes/s)			UP-state lag (ms) (Baseline)		Entrainment lag (ms)		UP-state Lag (ms) (Recovery Sleep)		Slope Change	
			Wake	*NREM*	*REM*	*Spikes*	*LFP*	*Spikes*	*LFP*	*Spikes*	*LFP*	*Spike*	*LFP*
CMT	9	6	7.0 ± 0.4	4.8 ± 0.2	25.7 ± 0.8	-58.9 ± 17.7	-49.8 ± 14.7	1.8 ± 0.6	2.8 ± 0.4	-76.8 ± 10.6	-69.9 ± 8.2	24.6 ± 15.2	22.4 ± 13.5
CING	8	6	5.1 ± 0.1	3.7 ± 0.2	24.5 ± 1.1	-20.6 ± 13.9	-21.3 ± 18.3	9.4 ± 0.5	11.6 ± 0.9	-20.4 ± 6.7	-30.5 ± 9.8	25.8 ± 16.2	21.6 ± 12.6
AD	9	6	8.7 ± 0.3	5.3 ± 0.2	26.6 ± 1.0	-7.9 ± 25.4	-3.5 ± 13.11	43.0 ± 1.5	45.4 ± 1.6	5.3 ± 10.5	7.9 ± 6.5	19.4 ± 13.7	17.4 ± 11.6
BARR	9	6	9.2 ± 0.5	4.6 ± 0.2	23.8 ± 0.9	47.4 ± 25.3	9.3 ± 11.7	63.0 ± 5.3	65.6 ± 1.6	42.4 ± 42.6	37.0 ± 6.3	-13.2 ± 9.1	-13.1 ± 9.1
V2	8	6	6.9 ±0.7	3.6 ± 0.4	24.8 ± 1.0	20.7 ± 20.4	13.7 ± 12.1	60.2 ± 1.9	58.8 ± 2.0	26.5 ± 11.6	26.4 ± 8.2	19.2 ± 11.3	18.4 ± 14.6
Reun.	23	6	5.3 ± 0.5	4.7 ± 0.3	25.5 ± 1.1	-44.1 ± 9.8	-48.4 ± 6.7	-	-	-33.3 ± 9.4	-32.4 ± 9.3	-3.2 ± 16.2	-3.1 ± 15.8
Rhomb.	7	6	6.7 ± 0.3	5.5 ± 0.6	26.7 ± 1.5	-59.9 ± 15.5	-42.7 ± 6.2	-	-	-32.8 ± 9.2	-33.7 ± 9.5	-13.2 ± 9.8	-16.3 ± 4.8
IMD	28	6	9.2 ± 0.5	5.6 ± 0.4	22.8 ± 1.4	2.8 ± 15.6	5.6 ± 30.4	-	-	16.8 ± 7.8	15.8 ± 7.7	-19.0 ± 8.5	-16.4 ± 8.1
PVT	8	6	6.9 ±1.2	3.9 ± 1.4	23.8 ± 1.2	4.3 ± 36.6	28.6 ± 15.1	-	-	8.9± 11.9	9.1± 12.1	-11.9 ± 9.8	-12.5 ± 8.4

Supplementary Table 1: Values presented as averaged spiking rates ± S.E.M.

Supplementary Table 2: Numbers of cells and animals recorded for each experiment.

	Condition	*Number of Cells*	*Number of Animals*
Fig. 1; Supplementary Fig. 12a, b			
CING	*Control*	13	6
PVT		8	
IMD		28	
CMT		22	
RHO		7	
REU		23	
Fig. 2; Supplementary Fig. 2, Supplementary Fig. 12c, d, e			
CMT	*Control*	8	6
VB		8	
Fig. 4; Supplementary Fig. 6			
CMT	*ChR2/ ArchT*	9	6
CING		8	
AD		9	
BARR		9	
VIS		8	
Fig. 5C, D, E, F			
CING	*ArchT*	9	6
BARR		6	
VIS		8	
Fig. 5K, L, M			
BARR	*ArchT*	6	5
VIS		6	
Fig. 5P, Q, R; Supplementary Fig. 10			
AD	*Ipsi. ArchT*	11	6
BARR		8	
VIS		12	
AD	*Contra.*	9	
BARR		9	
VIS		11	
Fig. 6C, D, E, F			
CING	*ChR2*	8	6
BARR		6	
VIS		7	
Supplementary Fig. 7			
CMT	*ChR2/ ArchT*	6	5
CING		7	
AD		5	
BARR		6	
VIS		7	
Supplementary Fig. 9			
CMT	*ChR2*	6	6
CING		6	
BARR		7	
Supplementary Fig. 10			
CING	*ChR2*	9	4
VB		8	
BARR		9	

Supplementary Table 2: Numbers represent multisite recording from animals in each experiment.

Supplementary Table 3: Sleep-wake transitions during acute optogenetics stimulation of thalamic neurons and efferent targets during NREM sleep.

			Latencies to awakenings (s)			
		No. Animals	**5 Hz**	**10 Hz**	**20 Hz**	**1 s**
CMT	ChR2	6	2.2 ± 0.9	-	1.1 ± 0.6	0.7 ± 0.1
	EYFP	6	51.3 ± 1.7	-	46.6 ± 0.9	51.6 ± 1.9
VB	ChR2	6	49.8 ± 0.8	-	50.5 ± 0.5	44.5 ± 4.2
	EYFP	6	53.5 ± 1.5	-	49.5 ± 1.5	52.0 ± 1.0
CING	ChR2	5	1.2 ± 0.2	2.9 ± 0.6	2.1 ± 0.6	1.3 ± 0.4
CING (control)	None	6	54.1 ± 1.6	-	55.3 ± 1.7	54.0 ± 1.3
Insular	ChR2	5	54.1 ± 1.6	53.5 ± 0.4	52.3 ± 0.9	54.0 ± 0.4
ZI	ChR2	5	53.9 ± 0.9	51.3 ± 1.7	54.0 ± 1.4	53.5 ± 0.3

Supplementary Table 3: Values presented as averaged time to awakening ± S.E.M.