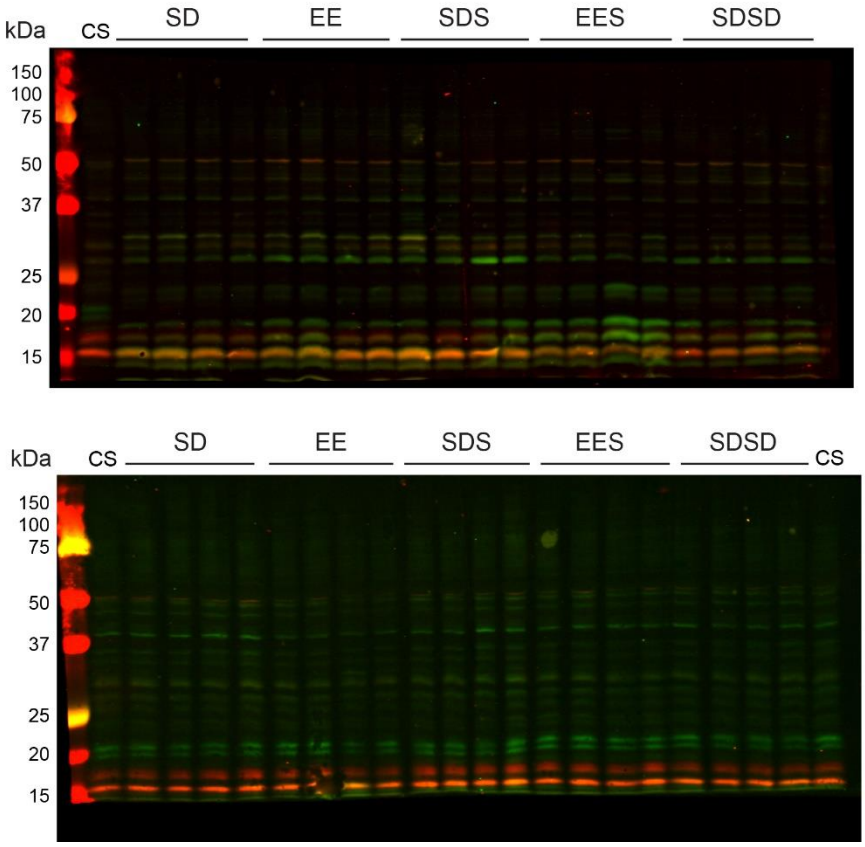

Figure S1. Original Western Blot images. Uncropped and unadjusted images of membranes used in **Figure 4** (upper blot) and **Figure S3** (lower blot). Groups are the same as in main figures. CS: Control sample.

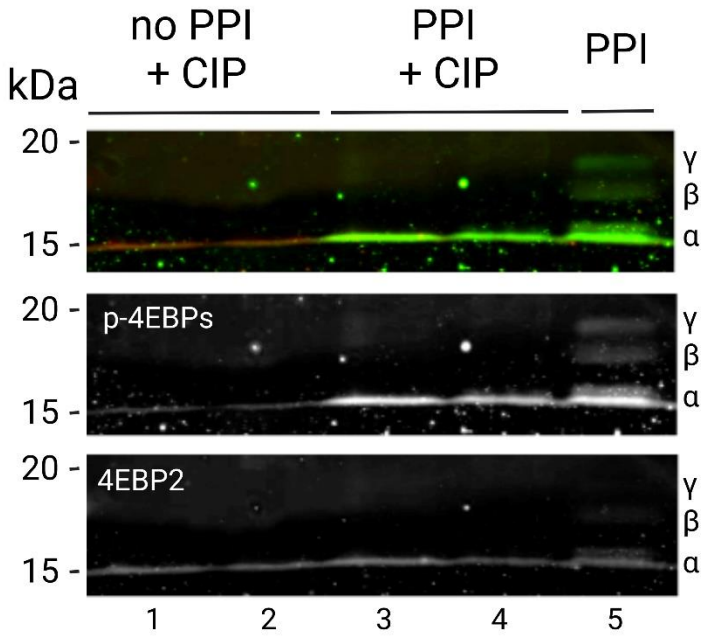

Figure S2. Validation of 4E-BPs phosphorylated forms. Western Blot of cortical extracts probed with antibodies detecting Phospo-4E-BPs (Thr37/46) shown in green and 4E-BP2 protein in red. The individual channels are shown separately below. **Lane 5**: phosphorylation profile of a representative sample used in the study (i.e., homogenised in buffer containing Phosphatase inhibitors (PPI)). **Lanes 1-4**: samples treated with Calf-intestinal alkaline phosphatase (CIP) with (Lanes 3 and 4) or without (Lanes 1 and 2) previous PPI treatment (see **Material and Methods**). Note the absence of the phosphorylated (β) and hyperphosporylated (γ) forms under CIP treatment after treatment with PPI and the disappearance of the hypophosporylated form when samples were not pre-treated with PPI. The unphosphorylated protein (4E-BP2 labelling) remain unaffected by phosphatases.

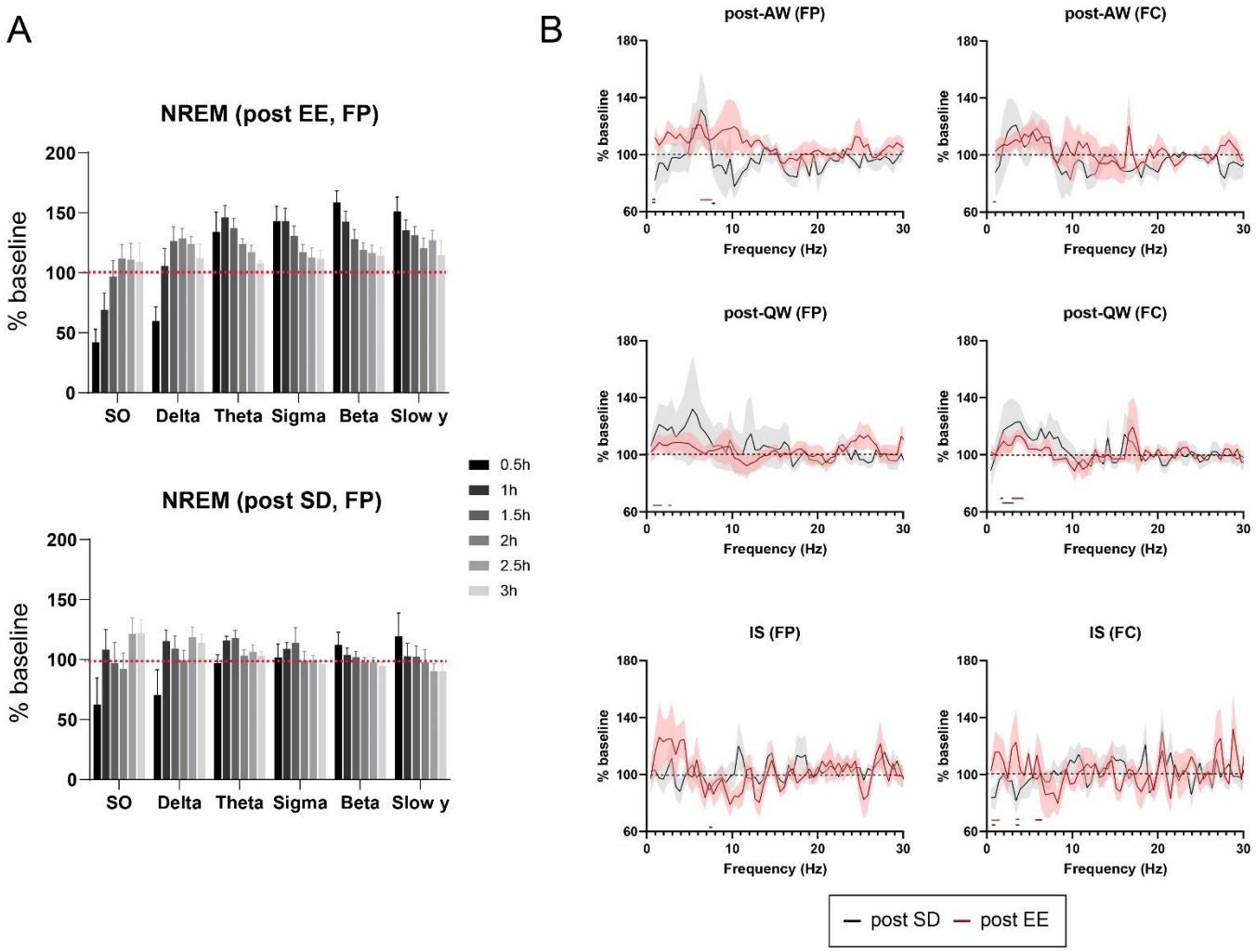

Figure S3. EEG changes during the post-SD/EE rest period. (A) Time course of changes in EEG power (parietal cortex) in all frequency bands (mean ± SEM) in 30-min bins for NREM sleep during the 3-hour rest period after staying awake in an EE or HC. **(B)** Change in mean (± SEM) power density for AW, QW and IS over the 3-hour awake period in EE or HC expressed as % of corresponding baseline values (see **Material and Methods**). The parietal and frontal EEG are shown separately. For clarity, only the presence of significant differences from baseline value are shown underneath the traces. Detailed statistics (Two-Way RM ANOVAs and level of significance for each comparison) can be found in the **Data S1**.

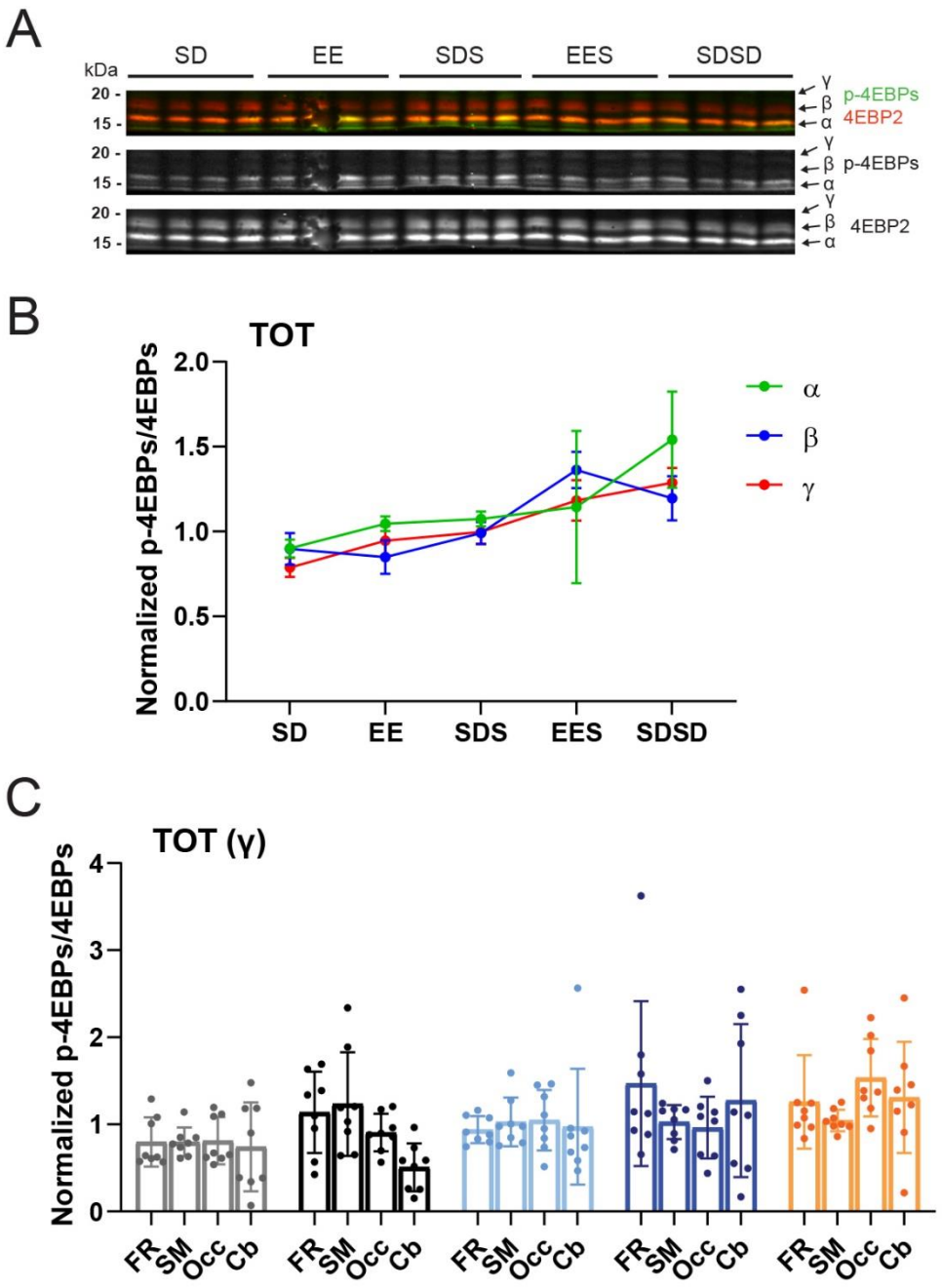

Figure S4. Sleep and experience-dependent changes in 4E-BPs phosphorylation in TOT fractions. (A) Representative Western Blot of TOT extracts probed with antibodies detecting Phospo-4E-BPs (Thr37/46) shown in green and 4E-BP2 protein in red. The individual channels are shown separately below. **(B)** Normalized mean (± SEM) signals from antibodies detecting P-4E-BPs/4EPB2 across groups. **(C)** Distribution of changes of the γ 4E-BPs form in TOT fractions in all 4 brain regions (N = 8/region). A two-way RM ANOVA revealed no effect of groups or brain regions.

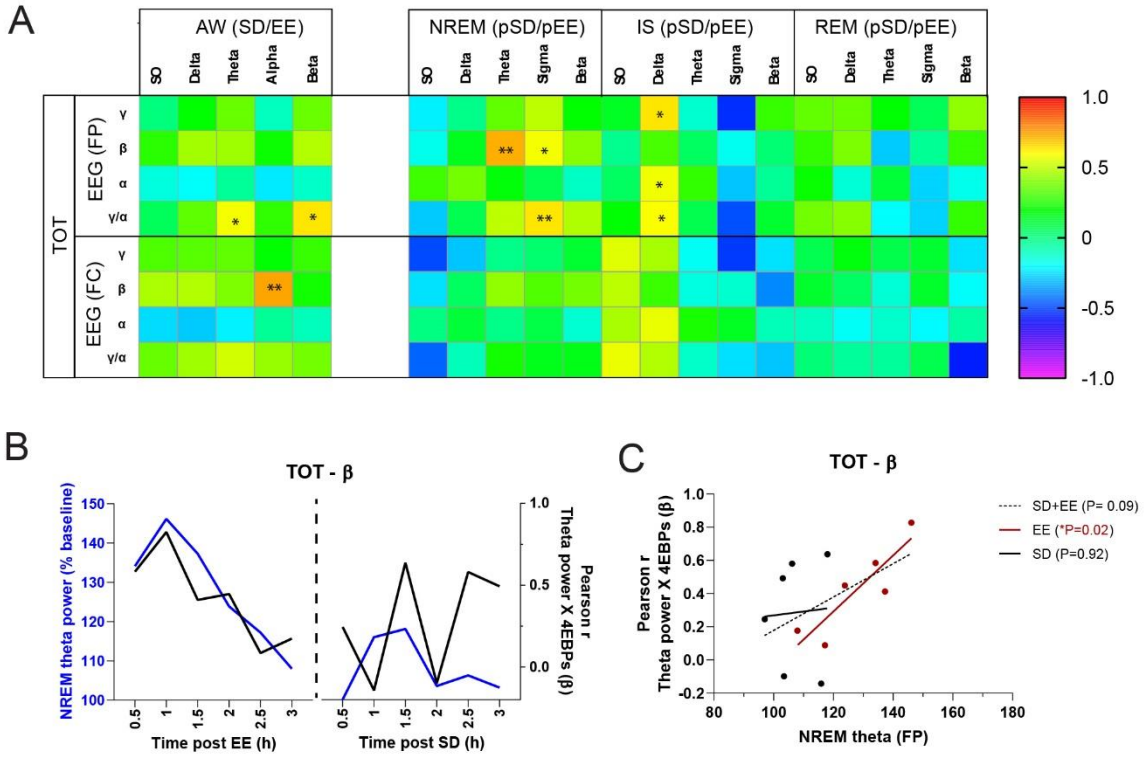

Figure S5. Relation between wake and sleep EEG changes and 4E-BPs measures in whole cellular fraction (TOT). (A) Correlations matrix between changes in frequency band power in AW during the 3 hours of wake (in HC and EE) or sleep (NREM, IS, and REM) during the rest period and changes in 4E-BPs forms (α, β, γ) and conversion index (γ/α ratio). Results are shown for the TOT fraction and separately for each EEG. Correlation coefficients were computed with datapoints from EE and SD groups combined. *P<0.05, **P<0.01, Pearson's. **(B)** Co-variation across the 3 hours post-SD or post-EE (in 30 minutes bins) of correlation strength between NREM theta (blue lines) and 4E-BPs β levels from the EE (*left*) and SD (*right*) group. **(C)** Scatter plot showing the significance of the co-variations shown in (B) for the EE group and SD group.