Assignment 8

1. Generate two random signals (S=[S0,S1]) and filter them in the range of [8–12] Hz using a bandpass filter. Create two mixtures of these signals [as X = np.dot(A,S)] using mixing matrices (A) corresponding to 1) a strong mixing (for instance, A=[[1.0, 0.7][0.5,1.0]]) and 2) a weak mixing (for instance, A=[[1.0, 0.2][0.1,1.0]]). Compute the correlation coefficients between amplitudes (i.e., amplitude envelopes) of X and the phase-locking values of X for the strong and weak mixings. Plot the signals before and after mixing (for the strong and weak mixings separately), and report the correlations and phase-locking values.

2. Generate two random signals and filter them in range of [8–12] Hz using a bandpass filter. Mix these signals using a mixing matrix (A) corresponding to a moderate mixing (for instance, A=[[1.0, 0.5][0.4,1.0]]). Plot the signal phases and the intervals of strong phase-coupling, for instance, np.cos(phase(X0) - phase(X1)) > 0.7.

3. Write a report about the tasks (3 pages max) including figures.

Save the report to a file (A08_your_surname.pdf) and upload it together with your Python script (A08_your_surname.py) to the assignment webpage. The *.pdf and *.py files can be zipped and uploaded as a single zip file (A08_your_surname.zip).