Dear Editor,

Thank you very much for forwarding the reports of the referees. We have endeavored to address all of the suggestions and have revised our manuscript accordingly. Main changes are highlighted in red in the revised manuscript. Our detailed point-to-point responses to these comments are presented in the reply letter.

With Best wishes

Chenggui Yao

To the editor,

Thank you very much for giving again an opportunity for our paper. In our paper, we consider the temperature-dependent white noise according the suggestions of reviewer. The white noise is just a stimulating current which can excite a spike in the first layer. Therefore, we firstly assume that the temperature on the noise (T_0) and the temperature on the neuronal network (T) come from two different heat source, respectively. In Sec. IV, we discuss the effect temperature on synchronization with T_0=T. We found that the temperature-optimized synchronization is general for different conditions, including the color noise only in the first layer, the white noise in the first layer with the strength of noise as a linear function of temperature $D=D_0\frac{T_0+273}{223}$, the white noise in the each layer, even for each layer with different temperature, even for the chaotic stimulus. Fig. 1 shows the results for the chaotic stimulus current.

To Referee 2

Thank you very much for reviewing!

Q: The parameter D, the "strength of noise" (see Table I) is not connected to the temperature - as it is now clear from Fig. 8 that show a constant temperature and a variable noise. Thus, the paper actually investigates the effect of temperature on the parameters, while the system is subject to a noise of some other origin. However, in Fig. 11 noise is connected to temperature in some unrealistic model: D=5+0.1*T (T measured in °C) Of course noise should be proportional to the temperature in Kelvin, say T_K=T+273,
which gives: D=5+0.1*(T_K-273) =5-27.3 + 0.1*(T_K)=-22.3+0.1*T_K That is, a noise term that can be negative - in practice the numerical simulations would give a minimum of the noise around 223 K (some -50°C), and noise would increase cooling toward the absolute zero. This proves that the authors have not really investigated the "temperature dependence" of synchronization, but the role of temperature in the parameters and of noise, of quite arbitrary or "ad hoc" intensity, in the dynamics. Shortly, the noise intensity and the temperature are treated as two different parameters, not connected to the same thermodynamic quantity.

A: In some fundamental models of statistical physics, the strength of noise depends on the temperature, namely, D= $\frac{T^{'}\beta k_B}{m}$ =k_0 T'=k_0(273+T_0), where k_0, T', and T_0 stands ratio coefficient, Kelvin temperature, and Celsius temperature respectively, and β, k_B, and m are is the damping coefficient, the Boltzmann constant, and the mass of the particle, respectively. In practice, the numerical simulations for the noise would give a very small strength of noise (D_0) around T_0=-50, therefore, we have D=D_0 $\frac{T_0+273}{223}$. Considering the noise as the stimulus current whose roles is to excites spiking in the first layer, in our work, we firstly assume that the temperature T_0 and T come from two different heat source, respectively (T_0 ≠ T). In Sec. IV, we discuss the effect temperature on synchronization with T_0=T. We found that the temperature-optimized synchronization is general for different conditions, including the color noise only in the first layer, the white noise in the first layer with the strength of noise as a linear function of temperature D=D_0 $\frac{T_0+273}{223}$, the white noise in the each layer, even for each layer with different temperature, even for the chaotic stimulus. Fig. 1 shows the results for the chaotic stimulus current.

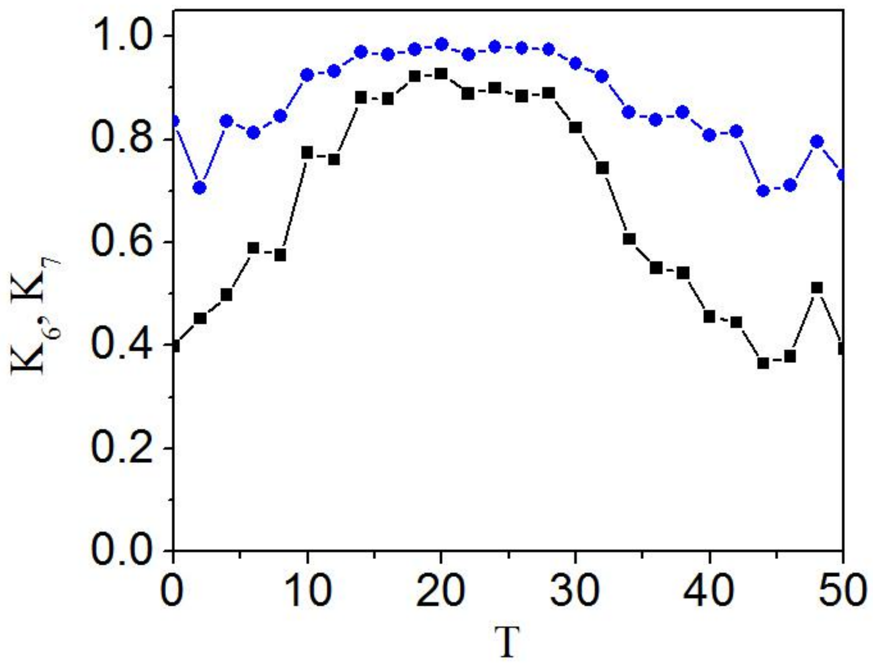

Fig. 1 The synchronous factor K at layers i=6and i=7 as a function of T for the chaotic stimulus currents which come from the chaotic Rossler system, dx/dt=-(y+z),dy/dt=x+0.25y,dz/dt=0.4+z(x-8.5).